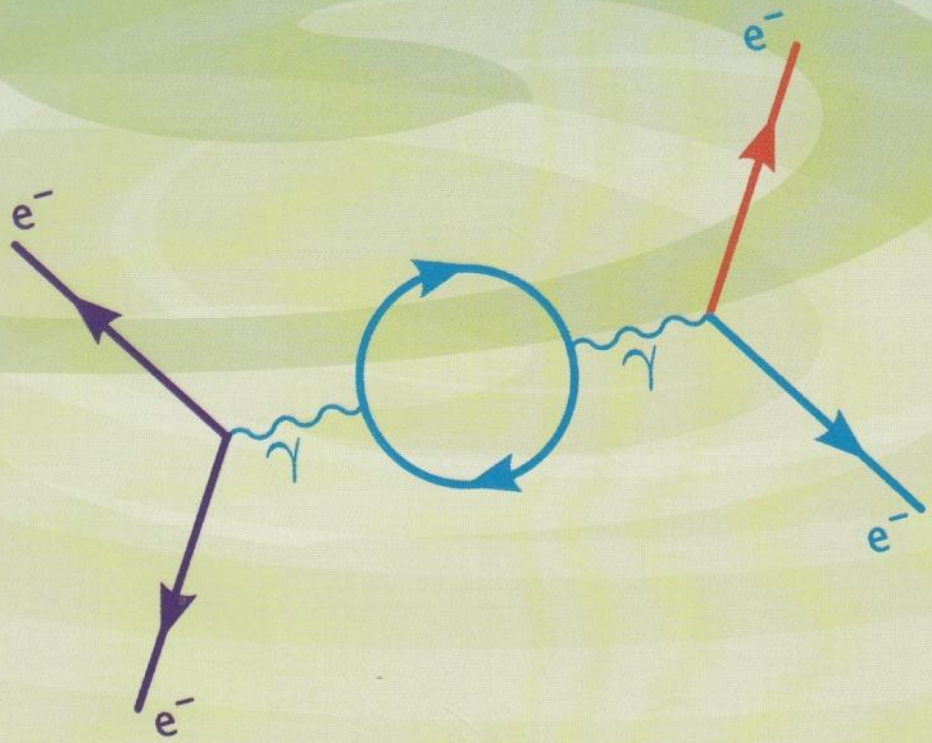
BdPhO

Dutch-Bangla Bank

Bangladesh Physics Olympiad

3rd

National Round



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BANGLA VISION
দৃষ্টি জুড়ে দেশ
A Satellite TV Channel

Organised by:

EASTERN UNIVERSITY
Distinction in Education

Eastern University
A leader in Quality Education

Program Schedule

First Session

09:00 - 09:45 am	Reporting time
09:45 - 10:00 am	Taking seat in the exam halls
10:00 - 12:00 pm	Exam
12:00 - 01:00 pm	Question and answer Session
01:00 - 01:15 pm	Documentary on Eastern University
01:15 - 01:30 pm	Scientific video show
01:30 - 02:00 pm	Lunch break
02:00 - 03:00 pm	Cultural program and organizer's review session

Second Session

03:00 - 03:05 pm	Inauguration
03:05 - 03:10 pm	Recitation from the holy Qur'an
03:10 - 03:15 pm	Welcome address by the convener
03:15 - 03:30 pm	Estonia IPhO video show
03:30 - 04:00 pm	Speech and crest exchange
04:00 - 04:30 pm	Award ceremony

Content

** Message order is not according to the seniority

Bangladesh Physics Olympiad Committee

Designation	Name
Chairman	Prof. Khorshed Ahmed Kabir Department of Physics, University of Dhaka
Vice Chairman	Prof. Muhammed Zafar Iqbal Head, Department of Computer Science & Technology, Shahajalal University of Science & Technology, Sylhet
	Prof. Yasmeen Hoque Chairman, Department of Physics ,Shahajalal University of Science & Technology, Sylhet
	Prof. Supriya Saha Department of Physics, University of Dhaka
	Prof. Zahid Hasan Mahmud Department of Applied physics, Electronics & Communication Engineering , University of Dhaka
	Prof. Kamrul Hasaan Department of Physics, University of Dhaka
	Prof. M.Arshad Momen Department of Physics, University of Dhaka
	Dr. Kazi Abu Sayeed Assistant Professor, Department of Electrical & Electronics Engineering, NSU, Dhaka
General Secretary	Mr. F.A. Jahangir Masud Head of Operations, Oxford International School, SDS, IPSIT & Head of Physics, Oxford International School
Treasurer	Dr. Farseem Mannan Mahammedy Assistant Professor, Department of Electrical & Electronics Engineering, BUET, Dhaka
Executive Member	Mr. Md. Shamsul Alam Khan Lecturer ,Department of Physics, Ahsanullah University of science and technology, Dhaka
	Mr. Md. Nurul Kabir Head of Physics, Presidency International School, Chittagong
	Mr. Afroz Al Mamun Head of Academics, Oxford International School, SDS, IPSIT & Head of ICT , Oxford International School, Dhaka
General Member	Mr. Tahmedul Hasan Physics lab Teacher, Oxford International School, Dhaka

Dutch Bangla Bank 3rd Bangladesh Physics Olympiad 2013 (National Round)

Advisory Committee

Prof. Dr. Md. Nurul Islam, Dean, Faculty of E&T, EU	Convener
Prof. Dr. M. Kaykobad, BUET	Member
Mr. S. M. Bakhtiar Alam, Chairman, BOT, EU	Member
Mr. Abul Quasem Haider, Member BOT, EU	Member
Prof. Dr. A.K.M. Saiful Majid, Director, IBA, Dhaka University & Member, BOT, EU	Member
Prof. Dr. ABM Shahidul Islam, Professor, Dhaka University & Member, BOT, EU	Member
Mr. Anwar Hossain Chowdhury, Member, BOT, EU	Member
Prof. Dr. Mirza Golam Robbani, Chairperson, Dept. of EEE, EU	Member
Brigadier General Shafaat Ahmad, ndc, psc (Retd), Registrar, EU	Member

Organizing Committee

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Dr. Abu Bakar Siddiqui, Assistant Prof., Faculty of E&T, EU	Member
Mr. Mohammad Mahfuz Hasan, Assistant Prof., Faculty of E&T, EU	Member
Mr. Arafat Hassan, Sr. Lecturer, Faculty of E&T, EU	Member
Mr. Abdur Rob, Sr. Lecturer, Faculty of E&T, EU	Member
Ms. Farzana Rahmant Zaki, Sr. Lecturer, Faculty of E&T, EU	Member
Ms. Fahmida Rahman, Sr. Lecturer, Faculty of E&T, EU	Member
Mr. Mohammad Mastak Al Amin, Sr. Lecturer, Faculty of E&T, EU	Member
Mr. Abdul Quader, Lecturer, Faculty of E&T, EU	Member
Mr. Md. Ishuque Hossain, Lecturer, Faculty of E&T, EU	Member
Mr. Shariful Islam, Lecturer, Faculty of E&T, EU	Member
Mr. Shakil Hasan, Lecturer, Faculty of E&T, EU	Member
Ms. Mahmuda Akter Monne, Lecturer, Faculty of E&T, EU	Member
Ms. Noor E-Jannat, Lecturer, Faculty of E&T, EU	Member
Ms. Noman Hossain, Lecturer, Faculty of E&T, EU	Member
Mr. Ashif Iqbal Shikder, Lecturer, Faculty of E&T, EU	Member
Mr. Kazi Saiful Alam, Lecturer, Faculty of E&T, EU	Member

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Mr. Abdul Quader, Sr. Lecturer, Faculty of E&T, EU	Co-editor
Mr. Shakil Hasan, Lecturer, Faculty of E&T, EU	Member
Mr. Md. Atikuzzaman Limon, Senior Executive, VC's Office	Member

Nurul Islam Nahid M.P
Minister
Ministry of Education
Government of the People's
Republic of Bangladesh.

নুরুল ইসলাম নাহিদ এম.পি
মন্ত্রী
শিক্ষা মন্ত্রণালয়
গণপ্রজাতন্ত্রী বাংলাদেশ সরকার।

Message

It is of great pleasure for me to know that Eastern University is holding the Dutch-Bangla Bank 3rd Bangladesh Physics Olympiad 2013 the concluding event of which will be on 24th January 2013 on its own premises.

Science and Technology have always been very important subjects of study at every stage of our education. Now-a-days their importance has increased many-fold, individuals as much as nations cannot function efficiently in today's world without scientific and technological knowledge. The present Government of People's Republic of Bangladesh in its Education Policy and institutional monitoring puts a high priority on science and education technology education. The Olympiad is likely to go a long way in popularizing science and technology in the country.

I congratulate Eastern University and heartily wish the event every success.

(Nurul Islam Nahid M.P)

Adviser to Prime Minister
(Education, Social development & Political affairs)

Message

It gives me much pleasure to learn that the Dutch-Bangla Bank 3rd Bangladesh Physics Olympiad 2013 the National Round of which will be held on 24th January 2013 in Eastern University own premises.

The present age is the age of science and technology. No nation can make much way in the present- day world if it is not able to evolve its own scientific and technological know-how or has access to them and the conduct of its educational and practical life. Physics, mathematics and chemistry are the mother of all sciences and the Olympiad of this kind will go a long way in creating general atmosphere and attitude in favor of learning and teaching science objects.

I am happy that eastern university has taken upon itself a task which is actually a national responsibility. I sincerely wish this event a great success.

Prof. Dr. Alauddin Ahmed
Advisor to the Hon'ble Prime Minister
(Educaion, Social Development & Political Affairs)

Message

Physics is a natural science that involves a general analysis of nature and examines the basic concepts of energy, force, space and time. It helps us understand how the world and universe behaves and provides us with the knowledge to utilize what we have in nature to live. I am confident that future physicists who are gathered here will contribute to the development of the discipline, thus advancing science and technology for the benefit of mankind. Scientific knowledge is essential for the right comprehension of both abstract and physical reality. Science and more precisely physics. has a pragmatic aspect without which the comprehension of the operation of the world in which we live will be impossible.

The Olympiad is a symbol of friendship and solidarity between the participants using language of physics. The presence of so many students in one place competing in the solving of problems require creativity, originality and brilliance and it fills me ith hope that these participants will one day make our country proud. It is a pleasure to see Eastern University holding Dutch-Bangla Bank 3rd Bangladesh Physics Olympiad 2013 national round under the supervision of Bangladesh Physics Olympiad Committee.

Once again I wish success of the event and thank everyone that organized this magnanimous event.

Nazneen Sultana
Deputy Governor
Bangladesh Bank

Message

Physics has given us a beautiful picture of the world over a wide range of scales from the microscopic to the macroscopic. From the quantum theory of the basic constituents of matter, to the general relativity theory of gravitation, physics has contributed to many arenas of knowledge. In coming decades, we are going to witness a dramatic revolution in physics. We are entering a new phase driven by a new path of knowledge, where pure or applied physics also meets other disciplines like biology, chemistry, and engineering. So, for young talents who have a craving for knowledge, there is a huge potential to explore different possibilities in this field.

In this Olympiad the young participants will encounter challenging theoretical and experimental questions of physics. I am sure they will find it challenging and stimulating at the same time to work through these problems. Our hope is that the Physics Olympiad will encourage the students to take up a career in physics or the sciences. If not, then at the very least, we can expect that the spirit of unbiased inquiry and rationality picked up by studying physics will guide their lives. As such I am certain that participation in the Dutch-Bangla Bank 3rd Bangladesh Physics Olympiad 2013 will be a wonderful experience for all concerned.

As scientists, we have the privilege and the duty to create bridges among different thoughts, different religions and different societies. The Physics Olympiad is one of such beautiful bridges. I congratulate all those who are participating in the Olympiad and also the organizers for their excellent task. We are very much thankful to Dutch Bangla Bank for sponsoring this wonderful event. We are also indebted to Eastern University for hosting the national round of the Dutch-Bangla Bank 3rd Bangladesh Physics Olympiad 2013.

K. Kabir

Prof. Dr. Khorshed Ahmed Kabir
President, Bangladesh Physics Olympiad Committee
Chairman, Department of Nuclear Engineering, University of Dhaka

Message

A feeling of pride and pleasure invades me when I see Eastern University organizing the Dutch-Bangla Bank 3rd Bangladesh Physics Olympiad 2013, both the Divisional as well as the National event in its premises. Students interested in science all over the country are meeting to test their physics skill, eventually to be sent up for the International event. This expresses Eastern University's commitment towards promoting science and technology within the country and world wide. My heartfelt congratulations go both to the participants and the hosts.

The performance of Bangladeshi students in the International Physics Olympiad held in Estonia, speaks visibly not only of their merit but also of the country's effort and desire for advancement. In today's world progress is not possible without science and Eastern University's involvement in this Olympiad, shows its pledge to uphold its motto, 'Distinction in Education.'

I congratulate and wish those high performing students best of luck in advance, and hope they will return with laurels for the country in the Dutch-Bangla Bank 3rd Bangladesh Physics Olympiad 2013. My appreciation is also extended to the Engineering and Technology Faculty of Eastern University and all those involved, for their hard work and dedication in making this Olympiad a success.

S.M. Bakhtiar Alam
Chairman, Board of Trustees
Eastern University

Message

This is indeed a matter of great gratification for us that the National Olympiad Committee has decided to hold the Dutch-Bangla Bank 3rd Bangladesh Physics Olympiad 2013 at Eastern University. I congratulate the Committee and wish them well.

This age, the age that we are passing through, is the age of empirical search and knowledge. Physics as a subject of basic academic pursuit like Mathematics and Chemistry is an outstanding product of man's empirical genius and needs. Technology and skill-oriented know-how without which no social development and progress are possible in to-day's world are all offshoots of physical sciences. A few months ago Eastern University organized Maths Olympiad in Sylhet. These basic science-related events and exercises will certainly contribute significantly towards creating viable bias and atmosphere for science education in the country.

I hope everything will go well and the Olympiad will achieve its hoped-for success.

N. Islam

Prof. Dr. Nurul Islam
Vice Chancellor
Eastern University

Message

It gives me a great pleasure that Dutch-Bangla Bank 3rd Bangladesh Physics Olympiad 2013 is going to be held on January 24, 2013 in Eastern University, Dhaka, Bangladesh.

I certainly believe that the Physics Olympiad will make all the young learners more interested about science and physics and also will make them accomplish the scientific knowledge and the fascinating world of physics around them.

Dutch-Bangla Bank has been a big supporter towards improving the educational opportunities in Bangladesh. This physics Olympiad is one of the ways we promote educational excellence and encourage the skills that lead to this type of excellence. The collaboration, enthusiasm and excitement that surrounds The Physics Olympiad will ultimately promote the proliferation and dedication to scientific knowledge. The scientific knowledge is essential to national growth and development

I would like to extend my heartfelt gratitude to the organizers and the members of the Olympiad committee for organizing this event and appreciate the young participants in taking participation in the event. I hope the Dutch-Bangla Bank 3rd Bangladesh Physics Olympiad 2013 will enlighten the next generation of Bangladesh with the light of science in the 21st century

Finally, I wish success for the Olympiad.

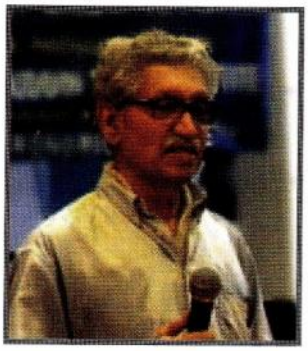
Sayem Ahmed
Chairman
Executive Committee of the Board of Directors
Dutch Bangla Bank Ltd.

Message

I am greatly elated as Dutch-Bangla Bank 3rd Bangladesh Physics Olympiad is going to be held on January 24, 2013 in Dhaka, Bangladesh in Eastern University. Bangladesh Physics Olympiad is a wonderful event that can act as a suitable platform for the young generation of the future scientists of our country a step ahead in fulfilling their dreams. In addition, it is a suitable platform for the young and talented scientists to be together to make a bonding between them and be a part of the scientific development of our country. Moreover, it will encourage them to nurture the notion of friendly spirit of competition which will equip them to cope with the competitive world.

I wish utter success for the Olympiad and those who are associated with this event. Contributions from all will certainly take the event to a great height and I believe this will positively bring glory for our country.

K. Shamshi Tabrez
Managing Director
Dutch Bangla Bank Ltd



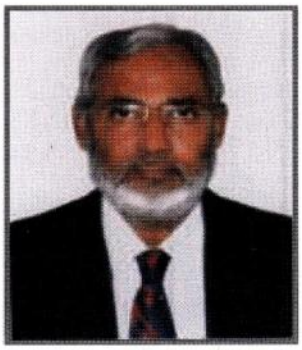
Message

A warm greeting to everyone who is participating in and has been working, in the making of Dutch-Bangla Bank 3rd Bangladesh Physics Olympiad 2013.

Recent research trends show a steady decline in students for scientific studies and in that backdrop, holding the Bangladesh Physics Olympiad for the Third time,by the Bangladesh Physic Olympiad Committee, is surely a very commendable effort. I would also like to express thanks to the Eastern University for facilitating the national round in their university premises.

I wish Dutch-Bangla Bank 3rd Bangladesh Physics Olympiad 2013 a very successful completion and all the very best to the young inquisitive minds who will be participating in the event.

Prof. Dr. A.R. Khan
President, Bangladesh Astronomical Society



Message

It gives me a great pleasure to learn that Eastern University, Dhaka is going to organize Dutch-Bangla Bank 3rd Bangladesh Physics Olympiad 2013 for National Round on the 24th January at its own premises. The students of Eastern University have in the past participated in many activities calling for leadership. The present activity demonstrates their eagerness to face another challenge of both national and international interest. I congratulate both the teachers and the students and the dynamic leadership for having undertaken such a praiseworthy step.

I want to remind all concerned that the purpose of participating in Physics Olympiad is not merely to earn laurel for oneself and the Institution. Participation, by itself, has a great value. It enables the students to understand the nature of the problems involved in the Olympiad, to have interactions with potential contestants at the national and international levels and to equip them with better preparations for such events in the coming years.

Attempts to do well in the contest with utmost preparations, courage and confidence is the key issue. Winning in the contest is not. I hope that the students participating at this contest will take the contest in that spirit. I wish them all success in their present venture.

(Prof. Dr. M. Shamsher Ali)
Founder Vice-Chancellor, Bangladesh Open University
Founder Vice-Chancellor, Southeast University
Immediate Past President, Bangladesh Academy of Sciences

Message

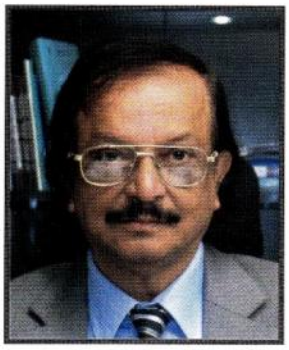
Olympic games were initiated in Greece but to find out the best performer in physical fitness. But in recent time science Olympiads are arranged for judging the intellectual power and the creative urge of the young scientists.

The success of Bangladeshi Students in the 2012 International Physics Olympiad, held in Estonia has rekindled my firm belief that our students are brilliant, analytical and hungry for knowledge. The nurturing of the young, impressionable minds of a nation require appropriate facilitation and holding of events like the Dutch-Bangla Bank 3rd Bangladesh Physics Olympiad 2013.

I would like to thank all the people who are directly or indirectly involve with this great event. Special thanks to Bangladesh Physics Olympiad Committee who has taken the responsibilities to run the Physics Olympiad every year and the Eastern University for organizing the national round for 2013.

I wish the program utmost success.

Prof. Dr. Ali Asgar
Former President
Bangladesh Physical Society



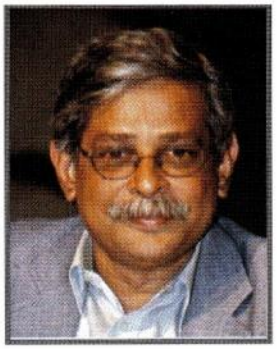
Message

It is not uncommon to find people in our society who have a somewhat less than respectable attitude toward persons with special intellectual abilities. We have created a peculiar educational system that equates the 44,000th student with the top, with the same CGPA, which perverts one of the most fundamental reasons for having an examination. The protagonists of such equalization do not mind discouraging the very best performance from every student, because differences are an impediment in exercising discretionary powers that some of them have acquired by law or by tradition, and also stand in the way of gaining general popularity with the masses.

In competitions such as the Olympiads there is no room for complacency. The competitor is not laid in a in a flat featureless delta, where any location is identical to another. Here the best can rise singularly to the top in a very steep hill, and be seen to be there. It honours and recognizes ability, interest and perseverance. It is necessary to pick up the best from the rest so that they may be given opportunities to rise further internationally, bringing glory to our nation and also to lead our national efforts in future in contributions to the pool of human knowledge.

I thank the organizers of the Dutch-Bangla Bank 3rd Bangladesh Physics Olympiad 2013 for their pioneering efforts during these formative years of the movement as much as the competitors, who, as international results indicate, have now reached the standard of the most developed nations. We are eagerly awaiting their contributions in the international arena to this most interesting and challenging field .

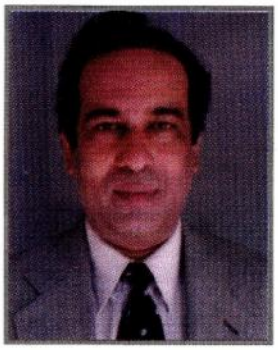
Prof. Dr. Ahmed Shafee
Vice-Chancellor
East West University



Message

There is a huge scarcity of physicists across the world as very few students are studying physics. So to popularize physics among the young people, holding of Bangladesh Physics Olympiad is a revolutionary step. Students who study physics will never face any tough time in their lives. It is a truth albeit unfortunate that the tradition in our country provides very little or no opportunities for the families and the schools to explore the students' creativity, especially in case of science and technology. Physics Olympiad is an attempt to uphold the fact that learning can also be a fun experience. This, I am sure, will encourage the young generation to change their outlook for studying physics and will also persuade the guardians to mentoring their children on the super highway of information and technology. It is really encouraging that the Bangladesh Physics Olympiad is being held for the 3rd time under Bangladesh Physics Olympiad committee and we hope that this will bring us one step ahead to our dream of Digital Bangladesh. I convey my heartfelt gratitude to Eastern University for hosting the national round and recognizing the importance and value of learning physics. I also congratulate all the participants for their enthusiasm and sincerity that has made Dutch-Bangla Bank 3rd Bangladesh Physics Olympiad 2013 successful.

Prof. Dr. Muhammed Zafar Iqbal
Senior Vice President, Bangladesh Physics Olympiad committee
Head, Department of Electrical & Electronic Engineering, SUST

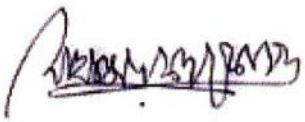


Message

IThis gives me immense pleasure to write a few words on the Dutch-Bangla Bank 3rd Bangladesh Physics Olympiad 2013 being organized by Eastern University. I take this opportunity to thank and congratulate Eastern University to contribute to the creation of stimulating academic environment beyond the walls of its premises by organizing similar events very regularly.

I cannot be sure when in Bangladesh we shall have the required farsightedness to invest profusely on education and follow the path of progress that Koreans have successfully traversed. Under the circumstances only hope for us is to keep the creativity of our kids alive through organizing popular science based contests. Fortunately, in Bangladesh we have been able to create the culture of organizing Olympiad activities in mathematics, informatics, physics and chemistry. Not only that our kids have won medals in the first three Olympiads at the international level!

I have the very best wishes for the participants of this contests and for the winners from which the team will be picked up for representation of Bangladesh in this prestigious International Physics Olympiad.



Dr. M Kaykobad
Professor
CSE Department, BUET

Message

It gives me immense pleasure to felicitate all the potential participants in the National Round of the 3rd Dutch-Bangla Bank Physics Olympiad 2013,organized by the Eastern University, Dhaka.

Science is exciting and Physics is always in the forefront of all scientific endeavours. From the ultimate structure of matter to the origin of the universe, Physics has been at the core of our attempts to understand Nature. Scientific thought does not recognize borders or limits. Science belongs to all people irrespective of their nationalities, religions, or political affiliations and most applications of science, which benefit society, have also had their origin, in one way or another, based on the principles of Physics. That is the beauty of this discipline and that is what attracts and excites young people who plan careers in Physics.

As this Physics Olympiad is being successfully organized in Bangladesh for the third time, I am sure that this intellectual contest will open up new vistas for the young talents of our country. In addition, it will create the opportunity for close bonding amongst talented young minds, thus building bridges across various Divisions of our country and increasing their potential for global exposure. All contestants, I firmly believe, will have a pleasant and memorable experience throughout this special event.

Ever since the inception of this event, we have been proud to be able to make a forum for students all over Bangladesh to augment their knowledge and experience for their future career. I wish you all a roaring success and achievement in this event through which we will be successful in achieving our goal to bring the young talents across Bangladesh onto one platform who will win laurels for Bangladesh at the forth coming International Physics Olympiad.I would like to take this opportunity to thank everyone directly or indirectly involved in organizing this event. I am particularly grateful to Dutch-Bangla Bank that so generously came forward to sponsor the 3rd Bangladesh Physics Olympiad-2013 which leads to participate in the 44th International Physics Olympiad to be held in Denmark in the near future. I hope this year we also bring the glory for our nation from IPHO.

Jahangir Masud
General Secretary
Bangladesh Physics Olympiad Committee

Message

I am very much delighted to know that the Dutch-Bangla Bank 3rd Bangladesh Physics Olympiad 2013 is going to be held at the premises of the Eastern University. This will be a nice occasion for the congregation of young inquisitive students of different schools and colleges of Bangladesh. Since this Olympiad will offer opportunities for competitive and interactive sessions, I hope that the participants will be highly benefitted out of this type of scientific activity. Moreover the young students will be motivated towards the scientific revolution and creativity which will be very much helpful for the future productive enrichment of Bangladesh. On the eve of this occasion, I would like to thank the sponsors for extending their co operations in supporting this activity in a country where the science and technology are not properly encouraged and patronized.

I wish it's all out success.

Prof. Dr. Md. Nurul Islam
Dean, Faculty of Engineering and Technology
Eastern University

Message

I would like to begin by thanking Eastern University for supporting Dutch-Bangla Bank 3rd Bangladesh Physics Olympiad 2013 to encourage students of physics. Physics is the core discipline of the world, training people to ask the right question at the right time. Physics lies everywhere and enlightens many branches of knowledge and if you study physics, you will understand everything in the world. And it is essential to explore this branch of science in order to advance in technology. We have many talents across the country and this Olympiad helps bring out the students' hidden talents in physics. Studying physics not only ensures a better professional life but also brings about a change in mentality – a mentality where students will critically think over all aspects of an issue instead of readily accepting it. We want this type of mentality so that we can overcome backlogs in our society and in our education. We want a Bangladesh of scientists, of creative thinkers and of people who will efficiently lead us in future. I appreciate the zeal the students have displayed through their healthy competitive approach that brings out the spirit of the Bangladesh Physics Olympiad.

Dr. Md. Mahfuzur Rahman
Convener, Organizing Committee, Bangladesh Physics Olympiad 2013 (National Round)
Chairperson, Department of Computer Science and Engineering
Faculty of Engineering and Technology

Editorial

Physics is believed to be the unified study of the basic forces of nature. These forces, though not visible, are at work constantly and incessantly. One of the oldest branches of science, physics has a major role to play in our lives. It instigates a logical outlook and invigorates the desire to know more imploring individuals to break the chains of conventionalism and step beyond the lines of imagination into a world full of possibilities. Bangladesh having embarked on a journey towards achieving the digital revolution needs to enthuse the young students to science as well as improve their physics skills.

Keeping that in mind, the Dutch-Bangla Bank 3rd Bangladesh Physics Olympiad 2013 is going to be held on January 24, 2013 in Dhaka, Bangladesh. It is going to be yet another opportunity for the budding geniuses of the country to prove their mettle and stride forward in materializing the dreams of becoming the future scientists of the country.

The first round of the Dutch-Bangla Bank 3rd Bangladesh Physics Olympiad 2013 is the 'Divisional Round' is scheduled to be held in the seven divisions (Dhaka, Chittagong, Rajshahi, Rangpur, Sylhet, Barisal, and Khulna) of Bangladesh. The students of different school and colleges (from class VII - XII) from all over Bangladesh participate in this round. The participants are divided into three categories: A (class VII- class VIII), B (class IX- class X) and C (class XI-class XII). From each division, a total of sixty students (20 students from each category) who are top in the merit list will be selected for the next round.

Total 420 students are going to participate in the 'National Round', which will be held at Eastern University on 24 January, 2013. Among them top 20 from category 'B'(5) and category 'C' (15) will be sent to the Physics Olympiad camp for training. 5 toppers among them will get the opportunity to take part in the International Physics Olympiad-2013 to be held at Denmark. Another group of 8 members will be sent to Indonesia for the 13th Asian Physics Olympiad. It will give the young learners to explore and divulge their knowledge and talent to the outer world.

This Physics Olympiad will help Bangladesh to earn fame and honor in the charming and fascinating world of physics. I am confident that the students who will qualify for International Physics Olympiad and Asian Physics Olympiad will bring accolade and distinction for Bangladesh.

Physics aims at explaining the very beginning of the universe. All the latest technology at our disposal has been developed using the fundamentals of physics. Imagination would be dark had it not been for the works of the great physicists of the past who explained the movement of the earth around the sun. The ultimate entity, the Universe, is also a subject matter for studies in physics. The theories of physics have far reaching applications in many other spheres like chemistry and technology.

Physics Olympiad is a platform where young, energetic and inquisitive youths will have the privilege to engage their minds in solving problems and will acquire fortitude and confidence towards facing the immense world of science. It will also give the talented one to have an opportunity to be a unique part of the era of the future scientific developments. In addition, it will bring all the young and enthusiastic scientists together to make a bonding of friendship and fellowship among them. Moreover, it will help to instill in them a sense of friendly spirit of competition which, in the long run will equip them in the better abilities to cope with the competitive world.

I believe the Dutch-Bangla Bank 3rd Bangladesh Physics Olympiad 2013 will be a grand success in instilling profusely the essence of science in to the young minds and drift them forward towards exploring more scientific knowledge and the fascinating facts of the world of physics around them.

Most importantly, I would like to extend my heartfelt felicitations to the organizers (the faculty members and officials of the E & T faculty) and the members of the Physics Olympiad Committee for their excellent and commendable initiatives in organizing this mega event. Besides, I would like to wish the young and exuberant participants the best of luck and thank them for their laudable efforts in taking this event to such an immense height. I am very optimistic that the Physics Olympiad will reach the zenith of its accomplishment and bring glory for the entire nation.

Fahmida

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Eastern University - A Brief Profile

Eastern University was established in 2003 under the Private University Act 1992, as amended in 1998. The University was set up by Eastern University Foundation - a non-profit, non-political and philanthropic organization. Its founders include academics, chartered accountants, engineers, industrialists and retired civil servants. At present, the Foundation has 30 members. The governance of Eastern University is carried out as per the Private Universities Act of 2010.

Vision

The vision of Eastern University is to become a leading University in the region in its chosen fields of higher education.

Mission

Its mission is to be a "Center of Excellence" by setting a new standard of quality teaching and quality education in Bangladesh, keeping in view the challenges of the 21st century.

Goal

Its goal is to produce future leaders with knowledge, skills and personal acumen essential for leadership in country's private and public sector enterprises in the increasingly competitive and globalized environment.

Faculties and Departments

The University currently has four Faculties: Faculty of Arts, Faculty of Business Administration, Faculty of Engineering and Technology and Faculty of Law. Under the Faculty of Arts there is one Department: the Department of English which has four programmes, namely B.A.(Hons.) in English, M.A. ELL (English Language and Literature), M.A. ELT (English Language Teaching) one-year and M.A. ELT two-year. The Faculty of Business Administration, like the Faculty of Arts, is a single Department Faculty and like Arts it has four major areas, namely Accounting, Finance, Marketing, Management and Human Resource. A few social science subjects are also offered by this Faculty. The Faculty of Engineering and Technology has two departments: Department of Computer Science and Information Technology and Department of Electrical and Electronics Engineering. The Faculty of Law is again a single Department Faculty having undergraduate and postgraduate programmes.

Curriculum

Eastern University follows North American model of curriculum in the fields of Business Administration, Computer Science and Electrical and Electronics Engineering; the UK model in Law and English. The academic programme is pursued through a framework of curriculum that includes splitting up of an academic year into three semesters: the Fall, the Spring and the Summer. The Curricula of the academic programmes are of international standard and are updated regularly to make it relevant to future job requirements of the students.

Teaching Philosophy and Methods

The Eastern University's objective is to raise a knowledgeable, skillful, conscientious and committed young work force and visionaries who will be able to assume leadership role in whatever situation they are likely to find themselves in the real world. It aims at instilling in students a perennial hunger for knowledge and quest for application methodologies and experties. For achieving this objective, carefully prepared classroom lectures are followed by tutorial classes and practical sessions aimed at enhancing students' problem solving skill, presentation skill and leadership qualities. A personalized attention is given to every student to search out the latent faculties and then effort is made to bring out the best in them.

Structure of Eastern University Governance

Although basically a private sector institution like other private Universities, governance of Eastern University is conducted on the basis of a wide consensus of several statutory bodies and committees which have recently been restructured according to the Private University Act of 2010. They are:

- Board of Trustees
- Syndicate
- Academic Council
- Curriculum Committee
- Finance Committee
- Teacher Selection Committee
- Disciplinary Committee
- Officials' Selection Committee

The overall policy guideline for the University is given by the Board of Governors comprised of thirty distinguished members including Chairman, three Vice-Chairmen, and the Treasurer.

Chairman

Mr. S.M. Bakhtiar Alam
B. Sc. (Hons.), M.Sc.

Treasurer (Acting)

Mr. Liaquat Hossain Moghul

Academic Programmes

Currently the following academic programmes are offered by various Faculties:

Faculty of Arts

- B.A. (Hons.) in English
- M.A. ELL (English Language and Literature)
- M.A. ELT (English Language Teaching) 2- year
- M.A. ELT (English Language Teaching) 1- year

Faculty of Business Administration

- BBA (Bachelor of Business Administration)
- MBA (Master of Business Administration) :
  - MBA Regular
  - MBA Executive

Faculty of Engineering and Technology

- B.Sc. CSE (Computer Science and Engineering)
- B.Sc. CSIS (Computer Science and Information System)
- M.Sc. CSE (Computer Science and Engineering)
- B.Sc. EEE (Electrical and Electronics Engineering)
- B.Sc. ETE (Electrical and Telecommunication Engineering)

Approval for B.Sc. in Textile Engineering is under process by UGC and it will be launched soon. Other programmes to be launched next include B.Sc. in Civil Engineering, Bachelor of Architecture, B.Sc. in Pharmacy and Post Graduate Diploma in Environment and Climate Change.

Faculty of Law

- LL.B (Hons.)
- LL.M

Students

The students admitted to Eastern University come with good academic background. More than 11,000 students have been admitted till Summer 2012 since the beginning of the University. Out of these, about 2590 have graduated. Other students are at various stages of their study.

Admission Schedule

Eastern University admits students every semester. Admission schedule of the semester is available on the web site of the University. The admission schedule may also be known from the Admission Office and from frequent admission announcements published by the University in the leading news papers. The students seeking admission should visit web site of Eastern University or contact the Admission Office for admission form and further information.

Admission Requirements for Undergraduate Programmes

Candidates with a minimum GPA of 2.50 at each of S.S.C./Dakhil and H.S.C./ Alim/Diploma from Technical Education Board or a minimum GPA of 2.00 at one of those exams with the total GPA of 6.00 are eligible for admission. GCE students must have passed 5 (five) subjects at O-level with average grade point 2.5 and 2 (two) subjects at A-level with average grade point 2.00. One `E' grade will be accepted either in O or A-level.

Admission Requirements for Graduate Programmes

Students must have a minimum second class or GPA of 2.50 at Bachelor level along with at least second division or GPA 2.50 at SSC & HSC exams or have passed at least five subjects at O level and two subjects at A level. Executive MBA Program requires, in addition, at least 2 years of job experience.

Faculty Members

Eastern University hires top-of-the class, talented graduates as junior faculty, experienced teachers and researchers as senior faculty and professionally accomplished teachers and experts as adjunct faculty. As of Fall 2012, the University has 95 fulltime faculty members including 5 visiting professors from Australia and USA. In addition, there are 66 adjunct faculty members.

Campus

The University campus consists of four large and spacious buildings - all located in the prime area of Dhanmondi, and easily accessible from any part of Dhaka City and outskirts by public transportation as well as auto-rickshaw and rickshaw. The required amount of land that is needed to be purchased for its permanent campus has also been finalized by the Board of Governors, Eastern University.

Partner Universities/Institutions

- **University of Worcester, UK**

  Eastern University has signed an agreement with university of Worcester, UK under which EU students of BBA program with 60 credits or more with a minimum GPA of 3.0 can transfer credits and can earn an UK degree.

  There is also a collaboration programme with ICM, UK & University of Worcester UK for postgraduate Business studies and the program is scheduled to start from March 2013.

  According to the collaboration agreement students will get the following benefits

  1. Multiple Awards (Master's from Worcester UK, and Dual Award-PG Cert & Diploma from EU and ICM, UK.)
  2. Flexibility to do certificate course from Bangladesh and remaining 120 credit course from UK, or to do certificate and diploma from Bangladesh and then 60 credit Master top up from UK (at reduce cost).
  3. Cost saving in comparison to do entire Programme from UK.

- **Yunnan University of Finance and Economics, China**

  Yunnan University of Finance and Economics China will provide a full scholarship to an Eastern University student each year and likewise Eastern University will sponsor a full scholarship for a Yunnan University.

- **Asian Institute of Technology (AIT), Bangkok, Thailand**

  AIT and Eastern University are working on a collaboration agreement, under which EU students of Engineering program with 60 credits or more with a minimum GPA of 3.0 will be able to transfer credits and earn a degree form AIT. After completion of 90 credits with a minimum GPA 3.0 students will be able to go to AIT to study 2 years and will get both Bachelor and Master degree form AIT.

- **Tampere University of Applied Sciences Finland**

- **University Malaysia Perlis , Malaysia**

- **Franklin University, Ohio, USA**

- **AIS, St Helen Institution, Auckland, New Zealand**

- **London Premier College affiliated with London University, UK Fen Liang. (International) Art College in Jiang Xi province of China**

Popularizing Science and Science Competitions

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Introduction

Scientists and engineers have played significant role in creating the civilization of the present day from those of ancient times, when human beings could not establish their superiority over other species. Nevertheless, it does not appear that our society is yet ready to recognize the hard work knowledge workers put together to create a better world for us. Ease of life and societal recognition do not appear to be for these dedicated souls that work so hard to discover the truth of the Nature and utilize it to the benefit of the mankind. Even then each branch of science and technology is fathomed, new branches are created by the scientists and engineers that are not as much recognized as workers of other fields of walk. No longer is now easy for a new comer to extend the horizon of any branch of science and technology. We need many dedicated brilliant souls to work in many different fields and in their still greater number of intersections. Never ever human civilization faced a situation where it needed more knowledge workers than now. But unfortunately leaders of civilization do not seem to be appreciative of the need of development of science and technology for the civilization to prosper. This era has become a lot too much market oriented with commitment and dedication being replaced by market economy. Our bright students with praiseworthy aptitude in physics, chemistry, mathematics and other branches of science and technology are opting for education in other branches that they did not pursue their education in only because now opportunities in those branches have been too much for them to take their eyes away and stick to the field they have proven capability and aptitude in. The society seems to have lost its grip to ensure its own survival and enrichment. However, responsibility of this self-destruction of the society should not only be borne by the over all leaders of the society, it will also lie on the shoulders of knowledge workers who are failing to convince the society of their usefulness for the survival of the civilization.

No field of human endeavors can be neglected even the least recognized, least appreciated, sufficiently ignored field of science and technology at least since without it no other field of human endeavors can survive not to speak of excelling.

We know sports and entertainment are very popular in our society of homo sapiens be it very brutal like wrestling, boxing or Spanish style bull fighting (corrida de toros) although we are supposed to excel over other species especially in our brain power and not necessarily on our brutal power or strength. A sportsman of the highest order of popularity, say in football, is appreciated and awarded by our society with a sum of some 100 million Euro at the age of thirty, whereas a grey haired Einstein is appreciated with an award of million dollar at the age of 42!!! Can this difference in recognition be logically established? There are hundreds of the highest achievers in science and technology who are recognized for their achievement by Nobel prizes at much later stage of their life, when these earthly awards could hardly be enjoyable. Commitment of science workers/educationists can be hardly exaggerated although remaining sufficiently ignored by the society. Dr Haim Ginott once rightly phrased, "Teachers are expected to reach unattainable goals with inadequate tools. The miracle is that at times they accomplish this impossible task." And recognition of these committed efforts by the society has been well spelled out by Evan Esar in the following statement "America believes in education: the average professor earns more money in a year than a professional athlete earns in a whole week." While ordinary people may fail to

appreciate the achievements in science and technology should the leaders follow the footprint of the popular trends or come forward to save humanity by appreciating the feat and encourage others in the field?

What is wrong?

In no case should popularity be the only consideration for degree of appreciation or recognition. The need of civilization, its priority should also be addressed for our survival. However, at the same time academicians have immeasurably failed to play their role in motivating due appreciation of the society for knowledge works. In fact, can we confidently say that science is popular among science students and science workers? Could we be confident that the best student in physics would prefer association of a Nobel laureate in physics to that of a well-known entertainer? If the words physics and scientist are replaced by corresponding entities of entertainment or sports would there be any doubt in the answer to the question? So we have to address the problem of making science events popular among science students and scientists at least as popular as entertainment or sports are popular to them. So far we have failed to do so. This has resulted in making it difficult to organize science events due to absence of sponsorship even from technology-driven companies who would prefer spending their money to areas other than science. Science exhibitions and science week events appear much more thrilling for students with the presence of an entertainer or sportsman and not with the presence of a scientist. Students and young people, who will be earning their livelihood in the name of science, find sports people and entertainers more attractive than people who excelled in this area. This has resulted not because these young people have wrong attitude rather because the whole society has been ignoring science workers to a level that it is extremely difficult to imagine that knowledge workers could be role model for young people. Scientists are often recognized at the national level with medals that possibly may not have any monetary value, although we do not fail to recognize best cooks or even pickle makers with sizable cash prizes, as we do to accomplishments in non-academic fields. It seems society feels scientists are priests, should be happy occasionally receiving fragranceless flowers and do not have any earthly needs to fulfill whereas achievers of any other field should be worshipped with flowers of fragrance.

Rewards and lucrative receivables from advertisements play a significant role in making sports and entertainment popular. Performance is recorded, analyzed and grouped in many ways, and stored using internet technologies for consumption by common people. The information is readily available to people of all strata. Moreover, quiz competitions are organized that force these statistics and facts to be memorized by young people. Good performances in sports are so adequately rewarded that in a flush of a second the achiever becomes a hero and popular among common mass. The same is not true in case of academic competitions. We have not been able to popularize academic competitions even in the academia. I cannot be sure whether in any country we have recorded great feats of students in public examinations. Say in Bangladesh we used to evaluate in 100 marks exam papers of physics, mathematics or any other subject of our post grade 10 public examinations for some forty years. Nobody knows maximum marks obtained in a subject where some 200,000 students sat for the exam not to speak of other records. The student, who obtained highest marks during the 40 year period of exams in each year of which some 200,000 examinees participated, is definitely gifted with praiseworthy aptitude in the relevant subject. Unfortunately examination authority failed to appreciate the feat, and failed to inspire other students with this feat and possibly failed to create challenge in young people to beat the record. This feat in academic competitions is a lot more reliable than that in any other field where degree of uncertainty is much more than that in any conceivable academic competitions. In sports like cricket we talk about records in the second innings or that of the 4th wicket. Can we imagine the corresponding statistics in academic field? How many universities and departments having world class reputation can claim to have records of performance of students in various disciplines and in different combinations? Only recently in the age of IT, ACM ICPC is finding it extremely difficult to find names of teams that excelled or became world champions in early days of this competition- that too not of distant old days but as late as 1978 (http://cm.baylor.edu/welcome.icpc). We have immeasurably failed in keeping the list

of world champions. Can we name a form of sports in which we have failed to keep the names? We create information technology and fail immeasurably to use this technology to the benefit and flourishing of our field, whereas people of other fields are using it to the benefit of their fields.

What is to be Done

Sports organizers and people in entertainment are highly successful in popularizing their events amongst common mass. Undoubtedly these forms of entertainment are easily appreciated by people of all strata. However, involvement of large sums of money also contributes to its popularity. If football and cricket players would have received 100 times less money than they are getting now these events would have lost significant amount of its glamour, and possibly would not have received this much popularity. If winning Wimbledon title is a feat that can be recognized by giving a prize money of a million pounds, how much should the winning team of ACM ICPC or the champion of IOI team receive? Is the later a lesser feat than the former one? In cricket even cracking a board placed out of the field by a flying ball is rewarded with monetary prizes. Organizers of games and entertainment programs are very successful in attracting CEOs of large enterprises to perform their corporate social responsibility through promoting and sponsoring their events. Academic administrators should also be able to inspire and convince knowledgeable CEOs to invest their resources towards academic events like Olympiads, programming contests and other events that will sharpen and enrich skill of young people that will move the civilization forward. Personalities like Alfred Nobel (Nobel Prize) and John Charles Fields (Field's medal) have done it. When some problems remained unsolved, different scientific societies offered lucrative prizes. In year 2000 Clay Mathematics Institute formulated Millennium problems and offered million dollars for solution of each of them. Very soon the great Grigorii Perelman resolved one of those long standing problems named Poincare conjecture, although was too discontented to accept the prize. In order to arouse interest of the common mass, events around these academic activities should be publicized over all possible media both electronic and printing. Moreover, interesting statistics related to these events should be made easily available to concerned people as sporting statistics are. Much publicized and well rewarded competitions go a long way to inspire youngsters achieve excellence in skills. While universities of Bangladesh are unable to penetrate into any honourable list of best universities of the world, it is popular competition that has resulted in our students participating in ACM ICPC World Finals with BUET participating in consecutive 15 years with reasonable performance, where from 50 to 100 teams from all over the world participate. Not only that we have 5 more universities whose teams made it to the top 100 whereas our universities cannot make it into the list of top 1000. Whereas there is no competition for excellence among our universities, there are regular programming contests that are inspiring the best of all universities. The same is true with our students participating in International Mathematics Olympiad(IMO) for a decade. While again we cannot proudly tell about excellence of our education system but young students are developing their analytical skill to do reasonably well in the level of IMO earning medals every year. Not only that in the highly publicized programming contests among university students in Bangladesh we are giving berth to a school team every year. In 2005 our school team could beat all university teams although programming is not seriously taught at school level. This was inspiring enough for young kids to earn silver medal in International Olympiad in Informatics in 2009 ahead of all contestants from Indian subcontinent, and in 2012 we received 2 bronze medals compared to a single bronze by Indian team. Our students have also earned a medal from International Physics Olympiad! This simply says how cost effective could be a popular academic competition in developing skills among our young students. Moreover, in recent years in Bangladesh these competitions have been popular also among common mass.

Events Around Academic Activities

So if we want academic events to gain popularity we must create events around it. For example, International Collegiate Programming Contest was first televised at Stockholm creating a lot of thrill as to which teams are getting winning positions. First solution of a particular problem was awarded. In this way fastest solution time can also be awarded. Once upon a time it was difficult to believe that common

people will be watching as boring a mental sport as chess is. Fortunately, even this sport with insignificant body movement could be made popular by televising it. Academic competitions should be opened for public enjoyment without first taking it for granted that there will be no interest among common mass of these mentally seriously involved games. Olympiads and programming contests should be publicized in mass media to attract attention of common mass so that they can appreciate commendable aptitudes of contestants in these events. International Olympiad in Informatics, International Physics Olympiad, International Mathematics Olympiad should be shown on TVs to inspire young people and find their heroes in the winners of these prestigious events. Achievements in this area should be duly recognized and rewarded to inspire young people's interest in aptitude and skill building. Leaders and enthusiasts of programming contests had to survive the ignorance of the results of International Olympiad in Informatics until IOI2010 organizers decided to come in favour of spectators and made a scoreboard available for them in the same spirit as it is being done in ICPC World Finals. I am sure it was enjoyable to well wishers of programming contests. How can a game be played with both spectators and players in the complete dark of the results? We should begin to think how excellence in all our academic activities can be enjoyed not only by people of the field but by people at large.

Conclusion

We must find ways and means to bring academic competitions to common mass, arouse their interest in these competitions and possibly make all sorts of statistics available especially to young people in order to create avenues for them to excel in their knowledge. As sports days are celebrated every year in each school so could we arrange annual co-curricular days in which we can find our math wizards, computer wizards and best in other fields. We should look for support of mass media so that information of academic events gain popularity in our society, and achievers get a better visibility in our society and the future generation does not opt for other areas of activities whence they have the required aptitude and due recognition in the society. Leaders of our nations should be convinced of the usefulness of duly recognizing scientific feats and adequately rewarding them so that science and technology are not thought of as neglected areas of human endeavours.

Concept of Control Engineering

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Modern engineering systems are mostly characterised by control system. All machines, like Aircraft, motor vehicles, shipping, production lines, oil refineries, manufacturing and domestic equipment all depend on control systems and sensors. So engineers need to know about modern control engineering principles, based on a solid foundation of theoretical and practical training.

In control engineering application of control theory is used to design systems with desired behaviours. Sensors measure the output performance of the device being controlled and those measurements can be used to give feedback to the input actuators that can make required corrections toward desired performance.
If some device is designed to perform without the need of human inputs for correction it is called automatic control (such as cruise control for regulating a car's speed). Control system engineering activities focus on implementation of control systems mainly derived by mathematical modeling of systems of a diverse range.

Control systems play a critical role in pilotless aircraft

Overview:

Modern day control engineering gained a significant attention during 20th century with the advancement in technology. It can be broadly defined as practical application of control theory. Control engineering has an essential role in a wide range of control systems, from simple household washing machines to most sophisticated aircraft of recent time. It seeks to understand physical systems, using mathematical modeling, in terms of inputs, outputs and various components with different behaviours ; use control systems design tools to develop controllers for those systems . A system can be mechanical, electrical, fluid, chemical, and even biological.

History:

Automatic control systems were first developed over two thousand years ago. The first feedback control device on record is the ancient Ktesibios's water clock in Alexandria, Egypt around the third century B.C. It keeps time by regulating the water level in a vessel and, therefore, the water flow from that vessel. This water clocks of similar design were still being made in Baghdad when the Mongols captured the city in 1258 A.D. A variety of automatic devices have been used over the centuries to accomplish useful tasks or simply to just entertain. The latter includes the automata, popular in Europe in the 17th and 18th centuries, featuring dancing figures that would repeat the same task over and over again; these automata are examples of open-loop control. Milestones among feedback, or "closed-loop" automatic control devices, include the temperature regulator of a furnace attributed to Drebbel, circa 1620, and the centrifugal flyball governor used for regulating the speed of steam engines by James Watt in 1788.

In his 1868 paper "On Governors", J. C. Maxwell (who discovered the Maxwell electromagnetic field equations) was able to explain instabilities exhibited by the flyball governor using differential equations to describe the control system. Elements of control theory had appeared earlier but not as dramatically and convincingly as in Maxwell's analysis.

Control theory made significant strides in the next 100 years. New mathematical techniques made it possible to control, more accurately, significantly more complex dynamical systems than the original flyball governor. These techniques include developments in optimal control in the 1950s and 1960s, followed by progress in stochastic, robust, adaptive and optimal control methods in the 1970s and 1980s. Applications of control methodology have helped make possible space travel and communication satellites, safer and more efficient aircraft.

Before it emerged as a unique discipline, control engineering was practiced as a part of mechanical engineering and control theory was studied as a part of electrical engineering, since electrical circuits can often be easily described using control theory techniques. In the very first control relationships, a current output was represented with a voltage control input. However, not having proper technology to implement electrical control systems, designers left with the option of less efficient and slow responding mechanical systems. A very effective mechanical controller that is still widely used in some hydro plants is the governor. Later on, previous to modern power electronics, process control systems for industrial applications were devised by mechanical engineers using pneumatic and hydraulic control devices, many of which are still in use today.

Control theory

There are two major divisions in control theory for engineering applications, namely, classical and modern . The scope of classical control theory is limited to single-input and single-output (SISO) system design. All systems are assumed to be second order and single variable, and higher-order system responses and multivariable effects are ignored. A controller designed using classical theory usually requires on-site tuning due to design approximations. Yet, due to easier physical implementation of classical controller designs as compared to systems designed using modern control theory, these controllers are preferred in most industrial applications. The most common controllers designed using classical control theory are proportional-integral-derivative(PID) controllers.

In contrast, modern control theory is carried out in the state space, and can deal with multi-input and multi-output (MIMO) systems. This overcomes the limitations of classical control theory in more sophisticated design problems, such as fighter aircraft control.

Control systems

Control engineering is the engineering discipline that focuses on the modeling of a diverse range of dynamic systems (e.g. mechanical systems) and the design of controllers that will cause these systems to behave in the desired manner. Although such controllers need not be electrical even then the control engineering is often viewed as a subfield of electrical engineering. However, the falling price of microprocessors is making the actual implementation of a control system essentially trivial.

Electrical circuits, digital signal processors and microcontrollers can all be used to implement Control systems. Control engineering has a wide range of applications from the flight and propulsion systems of commercial airliners to the cruise control present in many modern automobiles.

In most of the cases, control engineers utilize feedback when designing control systems. This is often accomplished using a PID controller system. For example, in an automobile with cruise control the vehicle's speed is continuously monitored and fed back to the system, which adjusts the motor's torque accordingly. In practically all such systems stability is important and control theory can help ensure stability is achieved.

Although feedback is an important aspect of control engineering, control engineers may also work on the control of systems without feedback. This is known as open loop control. A classic example of open loop control is a washing machine that runs through a pre-determined cycle without the use of sensors.

Control engineering education

At many universities, control engineering courses are taught in Electrical and Electronic Engineering, Mechatronics Engineering, Mechanical engineering, and Aerospace engineering; in others it is connected to computer science, as most control techniques today are implemented through computers, often as embedded systems (as in the automotive field). The field of control within chemical engineering is often known as process control

Recent advancement

Originally, control engineering was all about continuous systems. Development of computer control tools posed a requirement of discrete control system engineering because the communications between the computer-based digital controller and the physical system are governed by a computer clock. Today many of the control systems are computer controlled and they consist of both digital and analog components.

Therefore, at the design stage either digital components are mapped into the continuous domain and the design is carried out in the continuous domain, or analog components are mapped into discrete domain and design is carried out there. The first of these two methods is more commonly encountered in practice because many industrial systems have many continuous systems components, including mechanical, fluid, biological and analog electrical components, with a few digital controllers.

Similarly, the design technique has progressed from paper-and-ruler based manual design to computer-aided design, and now to computer-automated design (CAutoD), which has been made possible by evolutionary computation. CAutoD can be applied not just to tuning a predefined control scheme, but also to controller structure optimisation, system identification and invention of novel control systems, based purely upon a performance requirement, independent of any specific control scheme. It is expected that the progress in this field will continue unabated in future with further development of control theory.

[Source: Internet]

Importance of accuracy in applied subjects

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As per my observation, in Bangladesh we don't put much effort to select our aim in life? Do we? Should we? Yes, we should. I believe we should because this is a very crucial issue for human life and one is supposed to lead one's whole life as per one's aim in life. In fact aim is the outcome of one's cherished dream/desire to become someone what one should never loose or give up in any circumstances. In the context of Bangladesh, students usually study science to become Doctor or Engineer. They become so, sometimes, only because they got chance in those field of study. It may become dangerous if they really don't pick up the choice or if the choice is incidentally imposed upon him or her. He or she may not be aware of importance of accuracy in such applied sciences. Why I am saying so simply because some of the people find even after their retirement that they had wrong career throughout their whole life. One should pick up or at least try to pick up the right choice consciously with a vigorous self brain storming, in fair discussion with kith and kin, in consultation with related reputed personalities and so on considering his or her socio-cultural and economic background and should stick to it. I would like to mean that this brainstorming is a must.

When I went to Japan in 1999 for higher study at Hiroshima University, checking for driver's license was not very strict for foreigners. Our fellow students used to drive using Bangladeshi driver's license even after its expiry. I also did so for almost about six years. By this time I felt I had been driving very smooth and also I taught driving to several of my fellow country mates but with time checking for driving license had been intensified for foreigners. I got a permanent job in Tokyo and become afraid that I might pass whole of my life in Tokyo because getting a permanent job is rare. Usually foreigners get project based job with a fixed tenure of 1 year, 3 years, 5 years and so on. I got a permanent secured job with all fringe benefits including provident fund, social security fund, pension scheme, medical allowance and so on. So, I decided to get original Japanese driver's license.

Here accuracy matters! I got admitted myself in Japanese Driving School with a fee worth Bangladeshi Taka about 4 lacs. When I started attending regular classes I realized that I indulge myself at least for the double of the pre-calculated amount but my wife as well as my permanent job inspired me enough to go for it. Attending few classes, I realized that I had to have those classes prior to my driving back in 1999. I started blaming myself for doing the blender towards my self, my family and others who could be damaged by any accident. Fortunately we were saved. Japanese people strive to maintain 100% accuracy. Only this is the reason why Japanese products are worldwide attractive. In driving pass marks is above 90 percent. I thought I would pass the test easily considering few factors that I am a conscious personality with a Ph.D. degree, I have a pleasant driving skills with practical experience more than six years, high level of common sense and so on. All of my glorified pride smashed down suddenly when I successfully failed the exam for the first time. I failed in the second attempt as well and naturally it doubled my self blaming. I failed in the third time and it tripled my consciousness. I failed in the forth time and it quadrupled my inner thought. I started considering how I passed my Ph.D. in a single attempt. I failed in the fifth time and it helped me to become five time conscious than earlier in every expect of my life. I failed in the sixth time and it made me aware that I should be like Nepolean and inspired of passing in the seventh time. I failed in the 7th time and found that my accuracy has been increasing tremendously at every attempt of fail. I could score 88, 89 but I couldn't score 90 percent. They set the scoring in such level that if somebody touches that level it mean that he or she is really upgraded to that level.

After failing for the 8th time I met an African person and was discussing my previous attempts of fails. He smiled and informed me that he was going to sit for the 12th times.
Fortunately I passed in the 9th attempt. There are cases where someone passes in 22nd attempt.

After passing the test, I cried out!!

I had been in Tokyo for several years afterwards and couldn't dare to buy a car. While I was in abroad I always carried out a feeling that I am missing something. I came back Bangladesh in Aug 2010 and didn't dare to buy a car. Only few months ago, I bought a car and drove in Dhaka for few days with a feeling that I learned swimming in a swimming pool and expecting to swim in Buriganga/Turag without calculating its natural condition. Finally I have given up and hired a traditional driver…

This is the choreography of an unsuccessful driver who started driving unconsciously and stopped driving when he really learned it.

Should we become a Doctor or an Engineer unconsciously? Accuracy is much more important here as well as a clear determination to be so.

Cheers!!

The solar energy and Bangladesh

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Solar shingles are installed on a rooftop

The solar energy is very important due to an immense amount of constructive and helpful impact on the environment. Contrasting to the fossil fuels that is consumed and used daily, solar energy does not fabricate the excessively injurious pollutants that are liable for the global warming. Use of solar power reduces the quantity of contamination and toxic waste. Global warming is an issue of great interest. Very recently, with more awareness about the harmful effects of global warming, the issue is taken with great interest. There is in point of fact a massive belief that the use of fossil fuel is a contributing factor to the cause of global warming, which will ultimately cause the demise of the planet altogether. Probably the best part about solar energy is that it is a renewable source of energy, which basically means that it will stay there forever, it will be consumed for all practical human usages. Oil, coal etc, is all bound to finish one day and eradicate from the planet. So we want to use something more useful. The radiation that comes from the Sun along with the resultant solar energized resources such as wave power, wind, biomass and hydroelectricity all give an explanation for most of the accessible renewable energy that is present on earth. However, only an infinitesimal portion of the existing solar energy is used.

It is ultra clean, natural and a sustainable source of energy that can be utilized in the use of making solar electricity, solar heating appliances, solar cooling appliances and also solar lighting appliances. Another key aspect of using solar energy is about massive financial benefits. They can generally be seen in the reduction of our utility bills. Solar power would be consumed for the electricity for heating, cooling and lighting of our environment. Statistically, in the United States, consumption of the world's oil production is 25% on a daily basis. On the whole, the planet is being drained of all its oil resources and the energy prices are bound to go up. To only mend our own personal cost of energy needs is probably one of the smartest things to do and not to forget a very valuable future investment, when measured up to the unavoidable rise in the cost of energy in recent times as well as the not so far future. Solar energy systems are very much affordable, and with the help from the local programs that are now available to help in the installation costs, they seem to make much more sense than using other sources of generating energy apart from the solar energy.

A solar cell (also called a photovoltaic cell) is an electrical device that converts the energy of light directly into electricity by the photovoltaic effect. It is a form of photoelectric cell (electrical characteristics-e.g. current, voltage, or resistance-vary when light is incident upon it) which, when exposed to light, can generate and support an electric current without being attached to any external voltage source. Solar cells are often used to power calculators and watches. They are made of semiconducting materials similar to those used in computer chips. When sunlight is absorbed by these materials, the solar energy knocks electrons loose from their atoms, allowing the electrons to flow through the material to produce electricity. This process of converting light (photons) to electricity (voltage) is called the photovoltaic (PV) effect.

Solar cells are typically combined into modules that hold about 40 cells; a number of these modules are mounted in PV arrays that can measure up to several meters on a side. These flat-plate PV arrays can be mounted at a fixed angle facing south, or they can be mounted on a tracking device that follows the sun, allowing them to capture the most sunlight over the course of a day. Several connected PV arrays can provide enough power for a household; for large electric utility or industrial applications, hundreds of arrays can be interconnected to form a single, large PV system.

Thin film solar cells use layers of semiconductor materials only a few micrometers thick. Thin film technology has made it possible for solar cells to now double as rooftop shingles, roof tiles, building facades, or the glazing for skylights or atria. Some solar cells are designed to operate with concentrated sunlight. These types of cells are built into concentrating collectors that use a lens to focus the sunlight onto the cells. This approach has both advantages and disadvantages compared with flat-plate PV arrays. The main idea is to use very little of the expensive semiconducting PV material while collecting as much sunlight as possible. But because the lenses must be pointed at the sun, the use of concentrating collectors is limited to the sunniest parts of the country. Some concentrating collectors are designed to be mounted on simple tracking devices, but most require sophisticated tracking devices, which further limit their use to electric utilities, industries, and large buildings.

The performance of a solar cell is measured in terms of its efficiency at turning sunlight into electricity. Only sunlight of certain energies will work efficiently to create electricity, and much of it is reflected or absorbed by the material of the cell. Because of this, a typical commercial solar cell has an efficiency of 15%-about one-sixth of the sunlight striking the cell generates electricity. The first solar cells, built in the 1950s, had efficiencies of less than 4%.

Bangladesh is suffering from acute shortage of electricity. To overcome this crisis, Government is trying to develop atomic and other sources of energy. Under this circumstance, an alternative source of energy is expanding in Bangladesh specially in rural Bangladesh is the solar energy because of absence and inadequacy of continuous supply of electricity to the rural people. In the last 4th January 2009, Government has formulated plans to spread solar energy facility to more villages, sub urban areas and cities. To support the spread it is suggested to lessen the tariff and taxes from the imported items.

The maximum electricity that a solar panel can produce is 130 Watt(130 wup). By this panel, 11 CFL (compact florescent lamp) of 6 watt power and a17-20 inches black and white TV can run. Fan conducted on DC current can also be run by this solar energy. Grameen Sakti and few other companies are working to provide solar energy to the villages in Bangladesh. The companies are also interested to extend the service to the city dwellers. In this sector, there is scope for both local and foreign investment and also scope for both private and public entrepreneurship. It is learnt that the amount of investment in this energy sector in rural area per year is more than 2500 crore. 60% of the total invested in solar panel is required to be imported from outside. 25% is invested in battery and the rest 15% in small mechanical parts. Batteries and accessories are all produced in the country. In near future, the solar panel will also be produced locally. According to the insiders of the serving companies- about 20 thousand workers including 5 thousand engineers work in this sector. They hope that 100 thousand people will work in this sector by 2015. Now, more than 300 thousand houses (0.3m) of 465 upazilla of all the districts and 16 islands are getting the light from solar energy. The beneficiary of this system is about 3million. 44 megawatt electricity is produced everyday from the solar projects in Bangladesh.

We hope that the government will explore the potential of solar energy for Bangladesh and will provide necessary support to develop this industry in the country.

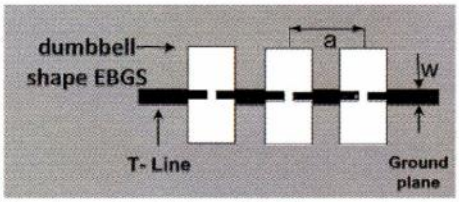
Attendee in International Conference on Electromagnetics

In 2012 faculty members and students of eastern university attended in lots of international events and conferences around the world. Eastern University always finances such kind of research works. 2012 IEEE Asia-Pacific Conference on Applied Electromagnetics (APACE 2012) took place in 11 to 13 December, 2012, at Avillion Legacy Hotel, Melaka, Malaysia. A faculty member, S. M. Shakil Hassan, lecturer, Eastern University, has attended on the event to present his research out there with following entitled research:

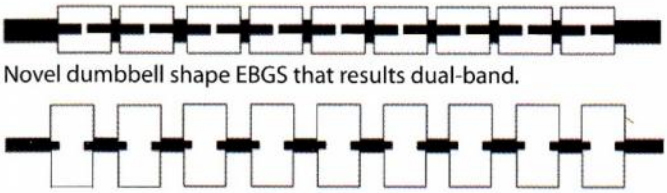
Dumbbell Shape EBG Structure - Worth to EBG Assisted Microwave Filter Designing

Electromagnetic bandgap (EBG) structures have achieved much interest in the field of microwave engineering. During the earlier stage of researches it was also termed as photonic bandgap (PBG) structure due to its satisfactory use in optical field. Transmission line periodically loaded with reactive element is referred to as a periodic structure that, in fact, shows passband and stopband performance at certain frequencies. EBG structures, similarly, are periodic structures that cause the suppression of surface wave and slow wave inside the EBG materials that result rejection of certain frequencies depending on the shapes in particular.

Novel designs of dumbbell shape EBGS have been reported with distinguished filtering features that include larger stopband, dual-band, multi-band and low-pass performance. None but dumbbell shape EBG structure alone can show all mentioned different performances with minor modification and change in dimensions. Beyond the conventional ideas a special idea has been incorporated by restructuring the size and dimension of EBG pattern to amend the result. Proposed designs showed excellent performances that obtained for much smaller etched area; hence ripple heights that mostly depend on etching area get reduced greatly.

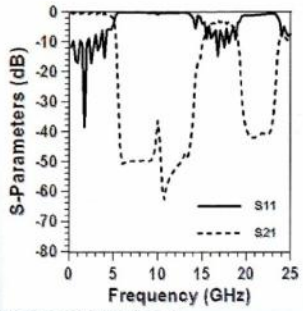


Novel dumbbell shape EBGS that results dual-band.

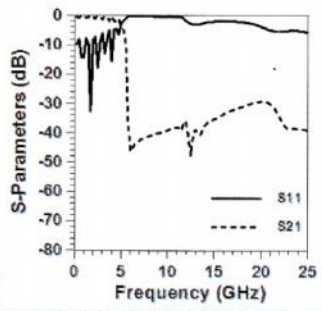


Novel dumbbell shape EBGS that results dual-band.

Novel dumbbell shape EBGS that



Very well defined
dual-band performance



Excellent performance as
low pass filter.

Several novel dumbbell shape EBG assisted designs are proposed with the best performances on the basis of classified performance inspection. Nothing but only the size and dimension have made the performance dual-band to multi-band and wider stopband to lowpass. The special idea of the paper is that - EBG elements of almost similar etching area with slight dimensional modification influence the s-parameter performance to a great extend i.e. wider stop-band turned into LPF performance and dual to multi band. Consequently, lattice structure is the most sensitive issue in designing dumbbell shape EBGS. Since distinct features can be obtained from dumbbell shape EBG structure; hence, it is really worth.

Discovery of Superconductivity

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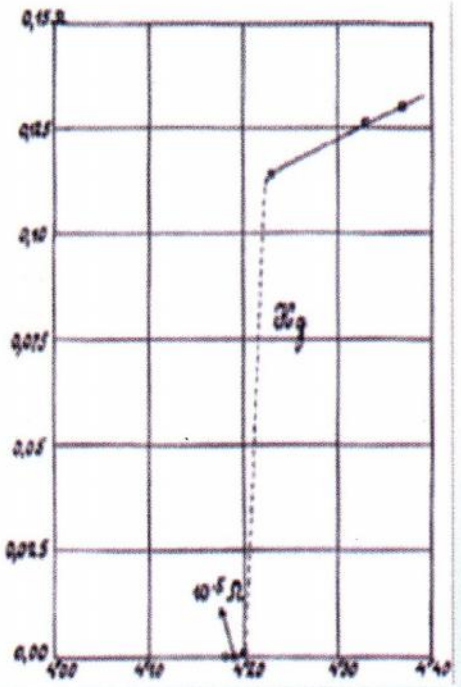
Which one is the most significant discovery in the field of condensed matter physics in the 20thcentury? The very question would provoke a great deal of debate among the physicists. Is itsuperconductivity? Birth of semiconducting devices? Quantum Hall effect? Or the modern daywonder material - graphene? The list can go on and on. Yet it is hard to deny that when theresearch team led by Heike Kamerlingh Onnes stumbled across the phenomenon ofsuperconductivity - the absolute absence of electrical resistance - at a laboratory in Leiden, theNetherlands, in 1911, the scientific community was caught by complete surprise. Over the last100 years superconductivity has been found in thousands of materials with varying degree ofcomplexity and the high transition temperature superconductors in cuprates pose one of thestiffest theoretical challenges, still more than quarter of a century after their discovery in 1986.In this short article I will try to give the readers some flavour of the events that led to thediscovery of superconductivity in mercury (Hg). The central figure of this story is of course HeikeKamerlingh Onnes, a person with extraordinary scientific ability. A genius. The discovery ofsuperconductivity was the culmination of a race between Onnes and the British physicist JamesDewar as they competed hard to reach ever lower temperatures by using more sophisticateddevices to liquefy gases. Onnes won the race after he successfully liquefied helium (He) bycooling it to 4.2 K in 1908, for which he was awarded the Nobel Prize for Physics in the year1913. In many ways liquefaction of He gave the birth of the vibrant field of low temperaturephysics. Onnes was interested in studying the conductivity of metals at extremely lowtemperatures and with his liquid He, was the only person well-equipped to do so. Although therewere certain suggestions, physicists on those days did not have a clue about what could happento the conductivity of a metal as the temperature is greatly reduced. Broadly speaking, physicistsat that time had three different proposals. The first one was that the conductivity would keepincreasing continuously as thermal scattering goes down. The second was that the conductivitywould saturate at some given low value because there would always be some imperfections offwhich electrons would scatter. Perhaps the most popular idea, however - predicted by theemerging picture of discrete and localized atomic orbitals - was that the conducting electronswould eventually be captured by the atoms, leading to zero conductivity or to an infiniteresistance. To find a definite answer, researchers needed metals with high purity. It is thisconsideration of purity that made Hg as the ideal candidate for experiment. It was Gilles Holst, aresearch associate of Onnes, who painstakingly distilled liquid Hg over many times to reach thedesired level of purity. Gilles' idea was to keep the pure Hg inside a capillary tube and thenimmerse the tube in liquid He to measure the conductivity as the temperature of the arrangementfalls. It was (probably) on the 8th of April 1911, Holst and the lab technician at Leiden, Gerrit Flim,observed to their disbelief, that the resistance of liquid Hg, when cooled to 4.2 K, suddenlyreached a value so small that it became impossible to measure - the hallmark ofsuperconductivity. On his notebook Onnes wrote "The temperature measurement wassuccessful. (The resistivity of) mercury practically zero". This abruptness in the fall of resistanceat around 4.2 K was striking and established at once that superconductivity is in fact an electronic phase transition.



Historical plot, showing superconductivity in Hg (taken from H. Kamerlingh Onnes Commun. Phys. Lab.Univ. Leiden. Suppl. 29 1911).

History credits - somewhat erroneously- Onnes as the only discoverer of what he, writing in English, called "supra-conduction". Surely the discovery had a lot to do with the liquefaction and low temperature expertise of Onnes, but Holst also played a significant role. Precision measurement of resistivity at such low temperatures was a daunting task in those days and Onnes and Holst were simply outstanding at this. The phenomenon of superconductivity was reported in 1911 with Onnes as the sole author. Such an event would be unthinkable today where the contributions from the co-workers were completely ignored. As with many other great discoveries, we can see that there was certain amount of luck involved. Helium becomes liquid at 4.2 K and the superconducting transition temperature of Hg is slightly below this temperature (which could be reached by evaporation of liquid He). Another sample with significantly lower transition temperature would have shown no superconducting behavior at all. As already mentioned before, it was the purity that made Hg as the sample of choice. But this question of purity was simply not that important. As long as the impurities are non-magnetic in nature, the superconducting transition temperature does not change in the elemental superconductors. Onnes discovered this in late 1912 and wrote "To my surprise, the resistance (of the mercury alloy and hence impure) disappeared in the same way as with pure mercury; much of the time spent on the preparation of pure mercury might therefore have been saved . . .". Even more ironically, had Onnes and Holst simply wired up a piece of lead or solder, which must be lying around the Leiden lab - rather than using mercury - their task would have been great deal easier, because lead (Pb) becomes superconducting at a much higher temperature of 7.2 K. Whether the resistivity of Hg actually became zero below 4.2 K, or falls below the resolution of the measuring device, was an open question in 1911. Paul Ehrenfest suggested an experiment to resolve this issue by setting up what is known as persistent current in a superconducting loop. In 1914, Onnes performed this experiment with a simple superconducting Pb loop using weak magnetic fields, where no sign of current decay could be detected. The excitement spread quickly. Paul Ehrenfest, who had actually witnessed the experiment, told Hendrik Lorentz that he was flabbergasted. In his own words- "I attended a fascinating experiment at the laboratory. .....Unsettling, to see the effect of this permanent current. It isalmost palpable, the way the ring of electrons goes round and round and round in the wire, slowlyand virtually without friction." Now we know that this persistent current, once set, can reallypersist for billions of years. Thus it was proven beyond doubt that superconductors actuallysuperconduct and for all practical purposes the conductivity is infinity. The theory ofsuperconductivity? Well, that was a different matter, it took over 40 years before a trulymicroscopic description for the simplest superconductors emerged in 1957. That is another storyfor another time.

High Performance Computing in Physics

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Computer modelling techniques are now influencing almost all areas of chemistry and physics, but there is no sub-discipline in which they have had a greater impact than materials chemistry and physics. Simulation techniques are now used routinely to generate accurate models of the structures of crystalline and amorphous solids, and to study surfaces and defects of complex materials and their properties; while the challenge of modelling properties and problems related to synthesis and reactivity is being met by increasingly detailed and realistic simulations. The rapid growth of the field has been enabled not only by developments in theory, algorithms and software, but also by the continuing exponential growth in the power of computer hardware. Two factors contribute to the latter: first, the improvement in the processing power from the increase in processing speed and the amount and speed of the available memory of the individual processors; secondly, the growing ability to exploit massive parallelism, in which computational tasks are distributed over large numbers (>1000) of processors. Because Simulations are simplified versions of the natural world, they have the potential to facilitate learning by focusing student's attention more directly on the targeted phenomena.

In comparison with alternatives such as textbooks, lectures and tutorial courseware, a simulation-based approach offers the opportunity to learn in a relatively realistic problem-solving context, to practice task performance without stress, to systematically explore both realistic and hypothetical situations, to change the time-scale of events, to interact with simplified versions of the process or system being simulated.
Visualizations may be especially useful for helping students see structure in phenomena and processes that are traditionally "invisible" to students. A process can be invisible if it is too small (bacterial reproduction) or too big (tectonic shifting) or too fast (chemical reactions) or too slow (evolution). Visualization can make these processes accessible so learners can perceive the important structures.

Student develop a more complete understanding of physical system by studying computational physics because the algorithms used in programs and the traditional equations of physics are the products of fundamentally different and complimentary modes of thought. Equations are statements of fact, while algorithms are the embodiments of processes. Students benefit by employing a variety of computational models to represent a single physical system and comparing their relative merits. This variety of alternative models is frequently not apparent in the simplified systems that are traditionally presented to the physics student. Numerically methods will make it possible to study systems that are not amenable to analytical solution, including complicated systems exhibiting emergent and chaotic behavior. Knowledge of the unique challenges of scientific computing (such as step and grid size, round off error, stability and program validation and verification) equips the student to develop solutions to a much broader range of systems.

Today CPUs are already on a saturation clock speed and constantly growing in computation power by multiplying the parallel computation core known as multi-core CPU. Our laptop or desktop today has more computation power then many supercomputers have a decade ago. With the dual core and quad core CPUs available in the current crop of personal computers and with 8, 16, 32 even 64 core machines expected in the next few years, the challenges and opportunities of HPC are rapidly coming to the desktop. And HPC cluster and grid computing make even more computational power available to those who know how to exploit their capabilities. It is even possible to utilize the MIMD (Multiple Instruction Multiple Data) and SIMD (Single Instruction Multiple Data) power of modern CPUs and GPUs (Graphics Processing Unit) in modern graphics cards to harness the power of embarrassingly parallel architectures that were once only the province of supercomputers.

The same is true for digital storage capabilities. Affordable desktop systems can currently contain more than a terabyte of storage and Grid users have access to petabytes of storage.

One important area of potential application of HPC is the handling of large datasets. A classical model of the state of on billionth of a mole of a substance (only 12 Nano-grams of carbon) would require more than a billion petabytes of storage. A brute force calculation of the mutual interactions of the gravitating bodies in a dwarf galaxy would require on the order of 10^18 calculations per time step. Compare this to the ~10^14 flop speed of today's fastest supercomputers. Climate models, Nano-scale physics, ocean modeling, fluid dynamics, protein folding and numerous other problems contain interesting physics that can only be revealed by simulation on HPC platforms.

There are also problems that don't require exceptionally large data sets, but do require a great deal of processing power. For example, a straightforward simulation of some bio-molecular processes requires more than 10^10 time steps. A realistic simulation of protein folding is beyond the capabilities of today's fastest supercomputers and even simulations of highly simplified hydrophobic-hydrophilic lattice protein models are NP-complete, but protein folding is an interesting real-world process that can be used in the classroom to illustrate important thermodynamic principles.

HPC is not only being used in science, it is being also used to process the financial market strategy or in a country level statistical data analysis. Another important and emerging field getting benefits of HPC is Medical Care. Diagnosis, detection, imaging techniques used in medical science, which are the practical applications of physics, demanding high performance computation for faster and more accurate results, better resolution in imaging, better detection in scanning like PET scan or 4D Doppler also in simulation like protein folding to understand the effect of a virus or malignant on healthy tissue or even neural mapping of brain or Brain Simulator to understand human brain.

But like anything else HPC also comes with some complexity. A host of issues arises when developing code for HPC systems. Multi-threading (MP), message passing (MPI), fault tolerance, bandwidth between stored data and compute nodes and more sophisticated algorithms (such as adaptive mesh refinement, iterative linear equation solvers and Barnes-Hut N-body solvers) are just a few of the issues that confront the HPC user, but are of little or no concern to those who develop code to simulate simple systems. Writing low-level HPC code can be a very difficult task that may only be appropriate for physics students in a research setting or as a special project, but reuse of the code written by others could play a significant role in physics education. Whether using an existing program, writing a program that calls routines from an open-source library, or simple examining the results of simulations performed by researchers, HPC simulations enable students to explore the physics of more complicated and realistic physical systems.

So, to keep up with the modern development of science specially physics we must adopt the computer modeling techniques which will sooner or later demand HPC. The sooner our physics research community can get HPC facility the better speed our physics development can have. Although a very basic programming skills with some advance technique is needed which is not hard to get for a physicist and also it is a very small price to pay for better research. On the other hand the hardware infrastructure of HPC is not cheap for large scale deployment and maintenance. For leading research in physics and other fields sometime HPC computation time must be bought from other country and the cost of the limited time schedule is far more than the a small or even medium size HPC facility. But being costly the resources can be shared among many faculty to minimize the cost. HPC facilities around the world are being built in this manner. Several organization or even several country contributing to a single HPC projects that can provide enormous computation facility available to all the groups and for rest of the country.

The journey of HPC in Bangladesh is already started last year in Rajshahi University at Physics Department. With the active help of ICTP a small cluster of 16 computation core with 32 GB or memory (2 GB per core) with high speed networking is established under direct supervision of Dr. Abdullah Shams Bin Tariq, Asst. Professor, Department of Physics and the a small research team from the host department is already using the facility. It is a very small facility in compare to a production deployment but important thing is the HPC era in Bangladesh has been already began and scaling up the facility is under processing. Any research group wants to use the facility can contact Department of Physics, Rajshahi University. The more research users will use it the more it will get a reason to scale up and expand to a production facility of thousands of cores even may be in a Peta-scale HPC facility what we'll dream about.

Strolling Through Time

Name: Adnan Salehin
Class: 10
School: Oxford International School

Is time travelling really possible?
Time travelling is indeed an achievable goal. It may not be so practically yet, but theoretically we can travel both back and forth in time.
Einstein's theories of relativity allow us to time travel in certain circumstances.
The two theories of relativity allow time travelling in the following manner:
General theory of relativity: Allows us to travel to the future by the differences in space-time distortion in different places.
Special theory of relativity: Allows us to travel to the future by travelling in relativistic speeds.

Time travelling by making use of the general theory of relativity:

The warping of time is such that the higher the contortion of space-time the slower time will pass in that region compared to a region where space-time is only slightly contorted. The general theory of relativity postulates that mass distorts, or to be more specific, curves space and thus time. The higher the mass of an object, the higher the curvature it creates in space and thus the slower time passes near it. This effect is only noticeable in places with huge mass differences.

Everything has its own mass and so its own gravitational force. The higher the mass of an object, the higher the gravitational force of that object. The theory proposes that gravity itself is the result of this curvature caused by the mass of an object. So, we can also say that, higher gravitational force indicates higher curvature in space-time around the object. So, we can say that time passes more slowly for a person who is standing on the ground than for a person who is standing on the 100th floor of a building. The GPS satellites use extremely accurate atomic clocks which need to be corrected every few weeks since they measure time at a faster rate than that on the earth. This happens because they are far away from ground level and the value of g there is less than 9.8. So, for the satellites, time passes at a faster rate than for us earthlings.

So, we can conclude that the higher gravitational force we experience, the slower time passes for us compared to someone who experiences less gravitational force. All we need to do to be in the future now is to stay near a massive object, like a black hole or a super red giant and then come back to earth. If we do that, a journey of five years might take us through the next fifty. Unfortunately we don't have the technology to do that right now.

Time travelling by making use of the special theory of relativity:

Special relativity tells us that the faster we travel the more time dilation we experience. Time appears to pass more slowly for someone moving at high speeds than for someone who is stationary. This is known as time dilation. We experience time dilation whenever we are on the move. Although the amount of time dilation we experience everyday is too small and insignificant to measure.

We can apply this principle to travel forward in time if we travel at relativistic speeds i.e. speeds close to the speed of light. After travelling around in space at such speeds for about two years, we might find that ten or more years have passed when we return home.

IS TIME REALLY THAT SIMPLE AS IT SEEMS?

Name: Mayesha Alma Marium
CLASS: XI, SECTION: AQUILA, ROLL:14
School: SUNNYDALE SCHOOL

First of all, I am going to ask one very simple question. What is time? The answer is also very simple. It is something that is measured in seconds, minutes, hours, days etc. However, if anyone is to take time as simply as a constituent of minutes or seconds, that person is totally wrong. Indeed, time is not as simple as it appears to us. It is a very complex thing. In fact, if we investigate deeper, it will soon be revealed that time is continuously playing with us. Perhaps, my story will be nothing but an imaginary science fiction to every reader. In spite of that, I can accentuate that my story is based on a strong scientific theory. Every scientific research and new invention, such as the aero plane, was nothing but the product of one's imagination to one's eye. For example, during the time of Jules Verne, there were no submarines or aero planes. As a matter of fact, there was no motor vehicle. Yet, he had described submarine and aero plane so perfectly in his fiction and today, these things are nothing but a piece of cake to us.

Let me begin with the story of a girl named Lucy. Lucy will travel from Dhaka to London and the distance is 5000 miles. If the speed of the plane, she is travelling in, is 5000 miles per hour, she will reach London in just 1 hour. If the speed is 5000 miles per second, it will take her 1 second to land on London. A very easy calculation.

All right, now let us consider the speed of the plane to be 50,000 miles per second. What then will be happen? Now, she can fly from London to Dhaka and back to London 10 times in 1 second. If this is to happen, in one second, which is indeed a very small time-just enough to blink, it will appear to people in London that she is in London at a particular time. However, people in Dhaka will also say that she is in Dhaka at that very particular time when people in London have also experienced her presence. Is it possible for a single person to be at two different places at the same time. Yet, for Lucy it was and thanks to her incredible speed!

Now let us increase the plane's speed further. Let us imagine the plane is travelling at the speed of light, that is , 300000000m/s. Practically, it is impossible but there is no fault to imagine it. Now, she will find herself in a very strange world where time is still. It does not flow and people in that world have no knowledge of the past or future. They only understand the present.

Now we are to speed up the plane in our imagination so that it travels faster than the speed of light. What will be the appearance of time to Lucy then? It will be quite funny. For her, the arrow of time will be in the opposite direction. What does this mean? For our world, the time travels towards the future as all the particles in this world have slower speed than light. Yesterday, today and tomorrow. First we are born, then we grow up eventually and lastly we die. However, if the arrow of time is in the opposite direction, this will not be so. There will be tomorrow, then today and at last yesterday. This means, first we will die then we will be born! Instead of growing up, we will be getting smaller! That explains how people in time machine can travel to prehistoric time. This sounds incredulous, doesn't it? Yet, this is the reality if you are to travel faster than the speed of light.

That is why the poet wrote:
"Lucy started a journey in the speed of light
Travelling in Einsteinean way, she reaches the previous night"

Lucy's story is imaginary but it is no fairy tale for it was based on a strong scientific theory-the theory of relativity. The great scientist, Einstein, has first presented it in 1905 and it was fully developed in 1915.There are some important rules about relativity.These are written below:

In this universe there are no particles that can travel faster than light. The speed of light is the absolute velocity.
The volume of the universe is constantly increasing.
There is no such thing as absolute time. Every time is local or as is observed by the observer. If two different people each of is in motion with different speed, they will record time differently.
For massive objects (such as the earth and sun) time flows slowly.

Yes, this rule looks and sounds very simple indeed. However, if we are to dive into the depth of their meaning, they do hold a very complex meaning such that our idea for the past thousand years about this universe has been proven completely wrong. Let us explain the last rule which says," For massive object, time flows slowly. A very simple example can be used to interpret its meaning. Consider two identical Chess clocks. These are a type of clock that can measure one-millionth of a second very perfectly and is used in many scientific research. One of them is kept in a place which is same as the sea-level. For example: the harbour of Mongla. Another is kept on a very high mountain (such as Mt. Everest). According to current belief, they should show the same time as they are identical. But not according to theory of relativity. Indeed according to theory of relativity, the clock at the sea level should be slower and there will be some difference in the time recorded. Another real example can clarify the matter. Two twin brother, one dwells at sea level and the other on a very high mountain top. Even though they are of same age, the one on mountain top will have faster growth compared to the one on sea level-as explained by the theory of relativity. However, if one of them is to travel in a spaceship which has speed nearer to speed of light, the difference in their age will be huge. After travelling for 1 hour in this speed, when the brother will return to earth, he will be awed to find himself a 25 years old man, while his twin has exceeded 50 years of age! This interesting phenomenon is well-known in the world of science as twin paradox.

The theory of relativity is not imaginary- it is established and proven. The modern and improved navigational system uses the theory of relativity especially in case of a signal coming from satellite. Ignorance of its effect would result in a mistake of several miles about the position of an object. Even at the heart of computer science, nuclear science and astronomy this wonderful theory still exists.

Time May Not Exist!

Name: Sajidul Hoque Siraji
School: European Standard School, Dhaka

In the lab, at the Max Planck Institute of Quantum Optics in Garching, Germany, the shortest time intervals are clocked using ultraviolet laser pulses to track the absurdly brief quantum leaps of electrons within atoms.The events probed last for about 100 attoseconds, or 100 quintillionths of a second. For a little perspective, 100 attoseconds is to one second as a second is to 300 million years.

But this is far from the frontier of time. There is a temporal realm called the Planck scale, where even attoseconds drag by like eons. It marks the edge of known physics, a region where distances and intervals are so short that the very concepts of time and space start to break down. Planck time-the smallest unit of time that has any physical meaning-is 10-43 second, less than a trillionth of a trillionth of an attosecond. Beyond that? Tempus incognito. At least for now.

Efforts to understand time below the Planck scale have led to an exceedingly strange juncture in physics. The problem, in brief, is that time may not exist at the most fundamental level of physical reality. If so, then what is time? And why is it so obviously and tyrannically omnipresent in our own experience?

The trouble with time started a century ago, when Einstein's special and general theories of relativity demolished the idea of time as a universal constant. One consequence is that the past, present, and future are not absolutes. Einstein's theories also opened a rift in physics because the rules of general relativity (which describe gravity and the large-scale structure of the cosmos) seem incompatible with those of quantum physics (which govern the realm of the tiny). Some four decades ago, the renowned physicist John Wheeler, then at Princeton, and the late Bryce DeWitt, then at the University of North Carolina, developed an extraordinary equation that provides a possible framework for unifying relativity and quantum mechanics. But the Wheeler-DeWitt equation has always been controversial, in part because it adds yet another, even more baffling twist to our understanding of time.

One finds that time just disappears from the Wheeler-DeWitt equation. It is an issue that many theorists have puzzled about. It may be that the best way to think about quantum reality is to give up the notion of time-that the fundamental description of the universe must be timeless.

No one has yet succeeded in using the Wheeler-DeWitt equation to integrate quantum theory with general relativity. Nevertheless, a sizable minority of physicists, believe that any successful merger of the two great masterpieces of 20th-century physics will inevitably describe a universe in which, ultimately, there is no time.

The possibility that time may not exist is known among physicists as the "problem of time." It may be the biggest, but it is far from the only temporal conundrum. Vying for second place is this strange fact: The laws of physics don't explain why time always points to the future. All the laws-whether Newton's, Einstein's, or the quirky quantum rules-would work equally well if time ran backward. As far as we can tell, though, time is a one-way process; it never reverses, even though no laws restrict it.

The mother of all initial conditions was the Big Bang. Physicists believe that the universe started as a very simple, extremely compact ball of energy. Although the laws of physics themselves don't provide for an arrow of time, the ongoing expansion of the universe does. As the universe expands, it becomes ever more complex and disorderly. The growing disorder - physicists call it an increase in entropy - is driven by the expansion of the universe, which may be the origin of what we think of as the ceaseless forward march of time.

Time, in this view, is not something that exists apart from the universe. There is no clock ticking outside the cosmos. Most of us tend to think of time the way Newton did: "Absolute, true and mathematical time, of itself, and from its own nature, flows equably, without regard to anything external." But as Einstein proved, time is part of the fabric of the universe. Contrary to what Newton believed, our ordinary clocks don't measure something that's independent of the universe. Maybe, clocks don't really measure time at all.

The point of view is consistent with the Wheeler-DeWitt equation. We never really see time. We see only clocks. If you say this object moves, what you really mean is that this object is here when the hand of your clock is here, and so on. We say we measure time with clocks, but we see only the hands of the clocks, not time itself. And the hands of a clock are a physical variable like any other. So in a sense we cheat because what we really observe are physical variables as a function of other physical variables, but we represent that as if everything is evolving in time.Instead of introducing this fictitious variable-time, which itself is not observable-we should just describe how the variables are related to one another. The question is, Is time a fundamental property of reality or just the macroscopic appearance of things? I would say it's only a macroscopic effect. It's something that emerges only for big things."

The problem, in brief, is that time may not exist at the most fundamental level of physical reality.

Quantum Computers - Now Made Near Future

Name: Saquib Rahman
Leader
The Volunteer Group
Bangladesh Physics Olympiad 2013

We can believe in this now - physicists no longer shape the future: they create it. In the case of Dr Haroche and that of Dr Wineland at least, this should be true.

So often when we indulge in a talk we discuss about the prospect of Digital Bangladesh in 2021. As students of physics, we should now focus upon the incumbent quantum computer revolution.

What is a quantum computer then, and what is so special about it?

In the present-day "classical" computer, the smallest unit of information is a bit, which we all know can take the value of either 1 or 0. In a quantum computer, however, the basic unit of information - a quantum bit or qubit - can be 1 and 0 at the same time. Two quantum bits can simultaneously take on four values - 00, 01, 10 and 11 - and each additional qubit doubles the amount of possible states. For n quantum bits there are 2n possible states, and a quantum computer of only 300 qubits could hold 2300values simultaneously, more than the number of atoms in the universe. (For comparison, a terabyte of information contains only 243 discrete on/ off values.) Now that leaves us something to think about. We are probably standing on the horizon of a completely new domain in information technology - if that's the word for it.

How have we come so far? Well, that's where Dr Haroche and Dr Wineland come in. The former, Monsieur Serge Haroche, is a professor at Collége de France and Ecole Normale Supérieure, Paris, France. The latter, Dr David Jeffrey Wineland, is a Group Leader and NIST Fellow at National Institute of Standards and Technology (NIST) and University of Colorado Boulder, CO, USA.

Serge Haroche and David J. Wineland have independently invented and developed ground-breaking methods for measuring and manipulating individual particles while preserving their quantum-mechanical nature, in ways that were previously thought unattainable. David Wineland traps electrically charged atoms, or ions, controlling and measuring them with light, or photons. Serge Haroche takes the opposite approach: he controls and measures trapped photons, or particles of light, by sending atoms through a trap. A possible application of ion traps is the quantum computer.

Wineland's group was the first in the world to demonstrate a quantum operation with two quantum bits. Since control operations have already been achieved with a few qubits, there is in principle no reason to believe that it should not be possible to achieve such operations with many more qubits.

However, to build such a quantum computer is an enormous practical challenge. One has to satisfy two opposing requirements: the qubits need to be adequately isolated from their environment in order not to destroy their quantum properties, yet they must also be able to communicate with the outside world in order to pass on the results of their calculations.

Yet the history of physics can assure us that we surely will not have wait too long before we witness a great revolution ourselves.

The GOD Particle: The Answer to the Origin of Universe

Name: Amlan Sinha, Class: XI, School: Sunnydale

Introduction

When one wanders about the gorges and valleys of the captivating world of physics, one of the most fascinating topics he is likely to come across is the GOD particle. This particle has gained its popularity in the recent times partly because of the name and partly because it gives us answers to innumerable questions; questions whose answers have been an elusive shadow just dancing out of the reach of scientists. The mystery of the mechanism that causes particles to have mass lies in the existence of the GOD particle.

Higgs Boson

The preferred name for the God particle among physicists is the Higgs boson, or the Higgs particle, or simply the Higgs, in honor of the University of Edinburgh physicist Peter Higgs, who proposed its existence more than 40 years ago. Most physicists believe that there must be a Higgs field that pervades all space; therefore the Higgs particle would be the carrier of the field and would interact with other particles. The entire space is saturated with the Higgs Field all the time, everywhere. The interaction of a particle with the Higgs Field is directly proportional to the mass of the particle; another way of putting this fact would be "it is the interactions of the particles with the Higgs Field that determines the mass of particles." The Higgs Boson is considered to be a large sticky particle and it is due to the presence of this sticky particle, the particles which interact with the Higgs Boson experiences a drag. It is this drag that results in particles having mass. According to an analogy: Different fundamental particles are like a crowd of people running through mud. Some particles, like the top quark, have big boots that get covered with lots of mud; others, like electrons, have little shoes that barely gather any mud at all. Photons don't wear shoes-they just glide over the top of the mud without picking any up. And the Higgs field is the mud.

The Higgs boson is presumed to be massive compared with most subatomic particles. It might have 100 to 200 times the mass of a proton. That's why you need a huge collider to produce a Higgs-the more energy in the collision, the more massive the particles in the debris. But a giant particle like the Higgs would also be, like all oversize particles, unstable. Hence, the particle does not stick around in a manner that we can detect; in a fraction of a second it will decay into other particles. What the collider can do is create a tiny, compact outburst of energy from which a Higgs might spark into existence long enough to be recognized. This can be achieved through the use of the Large Hadron Collider (LHC). It is a very big scientific instrument, specifically, a particle accelerator. It is like an atomic gun with the hadrons as the bullets. The Large Hadron Collider has been created to figure out what the universe is made of; in other words, to get to the very bottom of things.

The Large Hadron Collider (LHC):

In this machine, two beams of particles will speed in opposite directions around the tunnel. The tunnel forms an underground ring 17 miles in circumference. The beams of particles, guided by more than a thousand cylindrical, cold magnets, converge and thereby causing the particles to crash into each other at nearly the speed of light. This is how matter will be transformed by the violent collisions into wads of energy. This energy will condense back into various intriguing types of particles, some of them never seen before. Some of these particles will give us hints about the Higgs Boson. Major experiments that the LHC will perform are capable of recording the scrap of the disintegrating Higgs-the signal that a Higgs is decaying and lo and behold we will be able to know details about the Higgs Particle. However, the assumption is that only the rarest of collisions will produce a Higgs.

Conclusion

Scientists are still looking for answers to the enigmatic process of creating a Higgs. This will give us a clear picture the origin of the universe and how it came into being. This will indeed be a major breakthrough in the field of cosmology.

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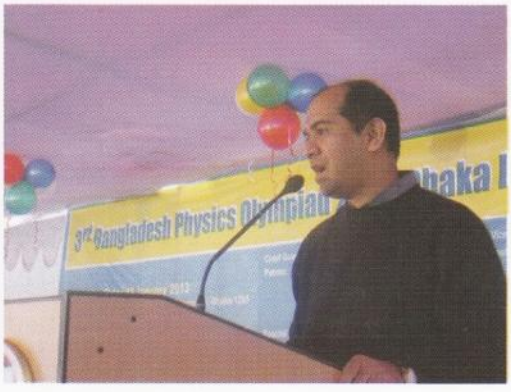

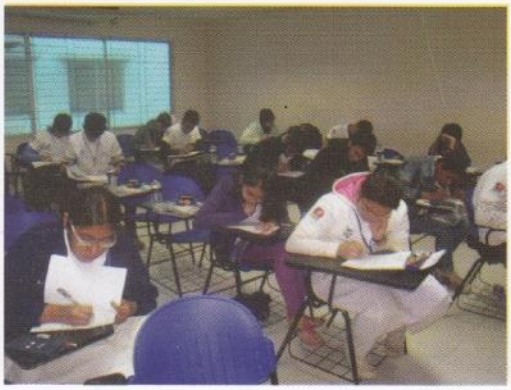

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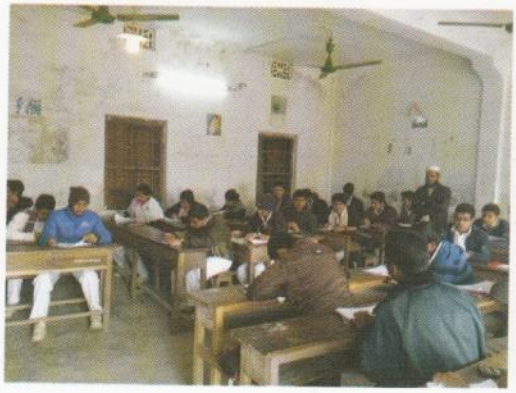

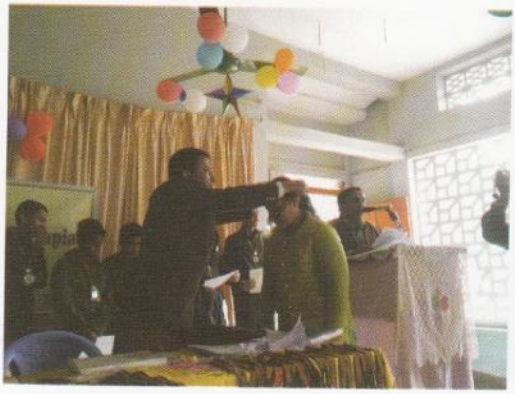

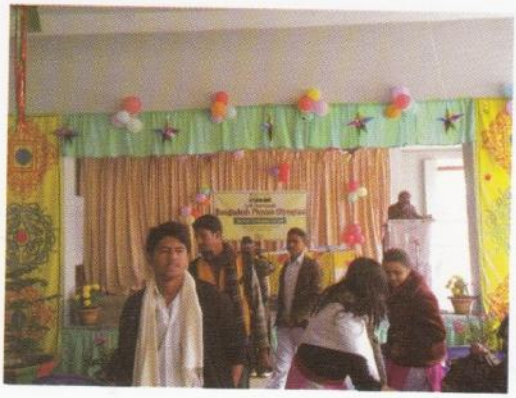

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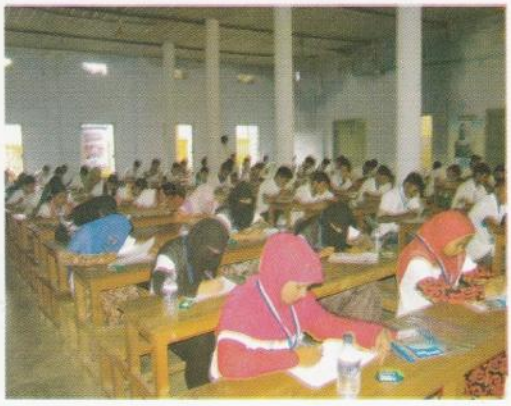

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রাজধানী ঢাকার অন্যতম বিনোদন কেন্দ্র
হাতিরঝিলের পূর্ব পাশে
আফতাব নগরে
নিজস্ব ভবনে ...

মিরপুর, কল্যাণপুর, শ্যামলী,আসাদগেট, ধানমণ্ডি, কলাবাগান, গুলশান থেকে হাতিরঝিলের ভেতর দিয়ে ইমপিরিয়াল কলেজে আসতে সময় লাগবে
মাত্র ৩০ মিনিট !

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১৯৯৫ সালে মাত্র ২০০ জন ছাত্র-ছাত্রী নিয়ে প্রতিষ্ঠিত হয় ঢাকা ইমপিরিয়াল কলেজ। বর্তমানে এর শিক্ষার্থী সংখ্যা প্রায় ২,৬০০ জন। ২০১২ সালের উচ্চ মাধ্যমিক পরীক্ষায় এ কলেজ থেকে জিপিএ ৫.০০ পেয়েছে ২২৩ জন।

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পরীক্ষার সাল	পরীক্ষার্থী সংখ্যা	জিপিএ-র বিন্যাস					কলেজের পাসের হার
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তুমি কোন কলেজে ভর্তি হবে?**

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Albert Einstein's Popular Quotes

1. Nothing happens until something moves

2. Something deeply hidden had to be behind things

3. Imagination is more important than knowledge

4. The important thing is not to stop questioning; curiosity has its own reason for existing

5. Try not to become a man of success, but rather try to become a man of value

6. The secret to creativity is knowing how to hide your sources

7. The difference between genius and stupidity is that genius has its limits

8. Weakness of attitude becomes weakness of character

9. Pure mathematics is, in its way, the poetry of logical ideas

10. Nature shows us only the tail of the lion. But I do not doubt that the lion belongs to it even though he cannot at once reveal himself because of his enormous size

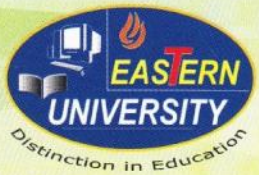
11. Only a life lived for others is a life worthwhile

12. I never think of the future. It comes soon enough

13. Anyone who has never made a mistake has never tried anything new

14. Common sense is the collection of prejudices acquired by age eighteen

15. Peace cannot be kept by force. It can only be achieved by understanding



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